# THE JOURNAL OF GAS LIGHTING
## WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXIII. No. 1613.] LONDON, APRIL 10, 1894. [46TH YEAR. PRICE 6d.



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Wenlock Iron Wharf, 21 & 22, Wharf Road,
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**Ashmore, Benson, Pease, & Co., Ld.,**
STOCKTON-ON-TEES,
Manufacturing Gas Engineers.
See Advt. p. 673, of this week's issue.

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FOR TOWN WATER-WORKS AND OTHER SUPPLIES.
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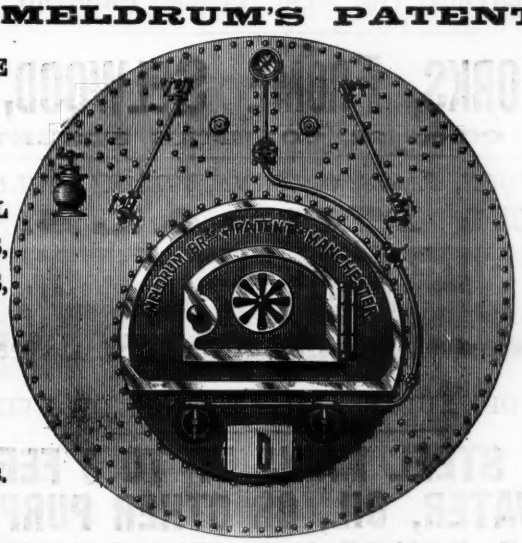


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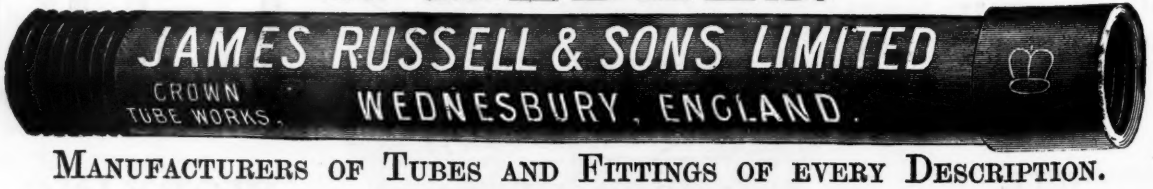


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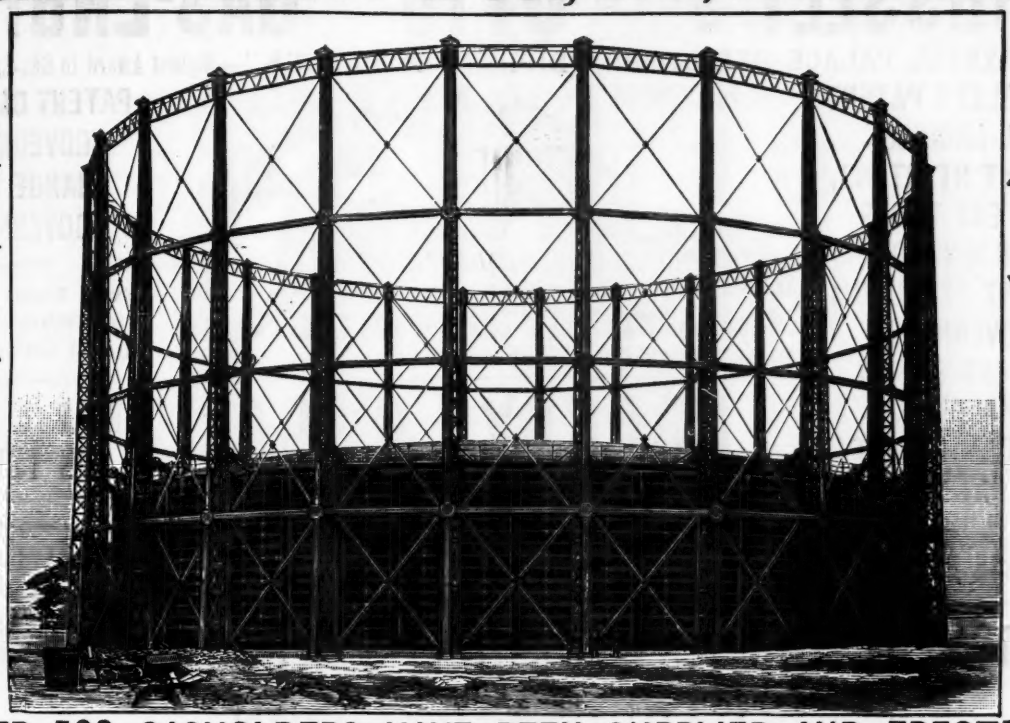

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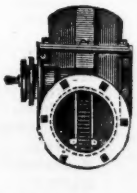

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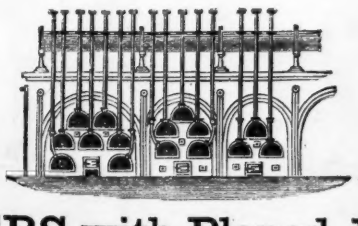

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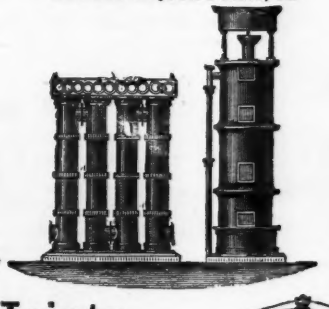

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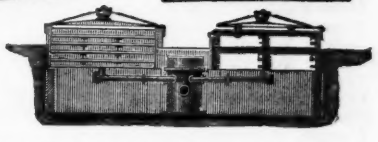

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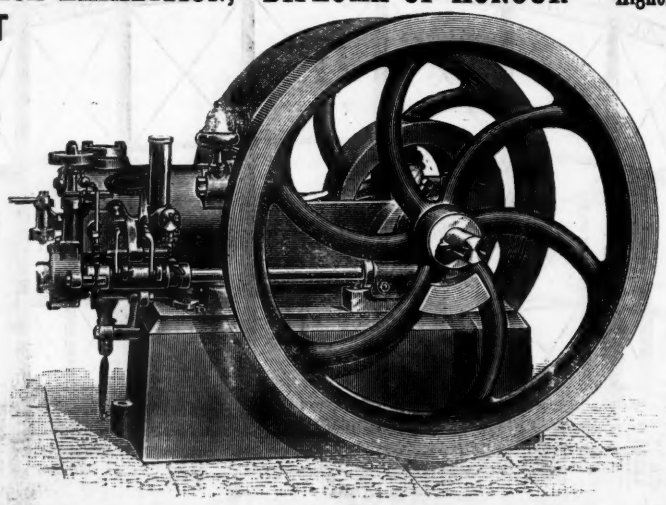

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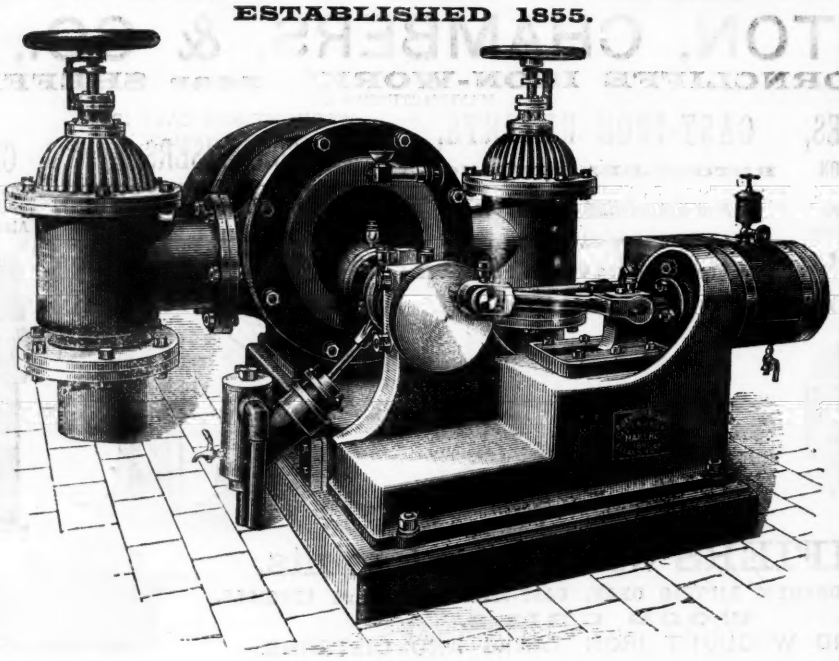

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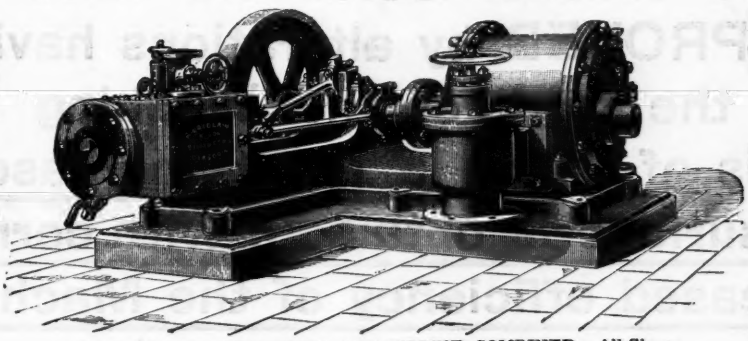

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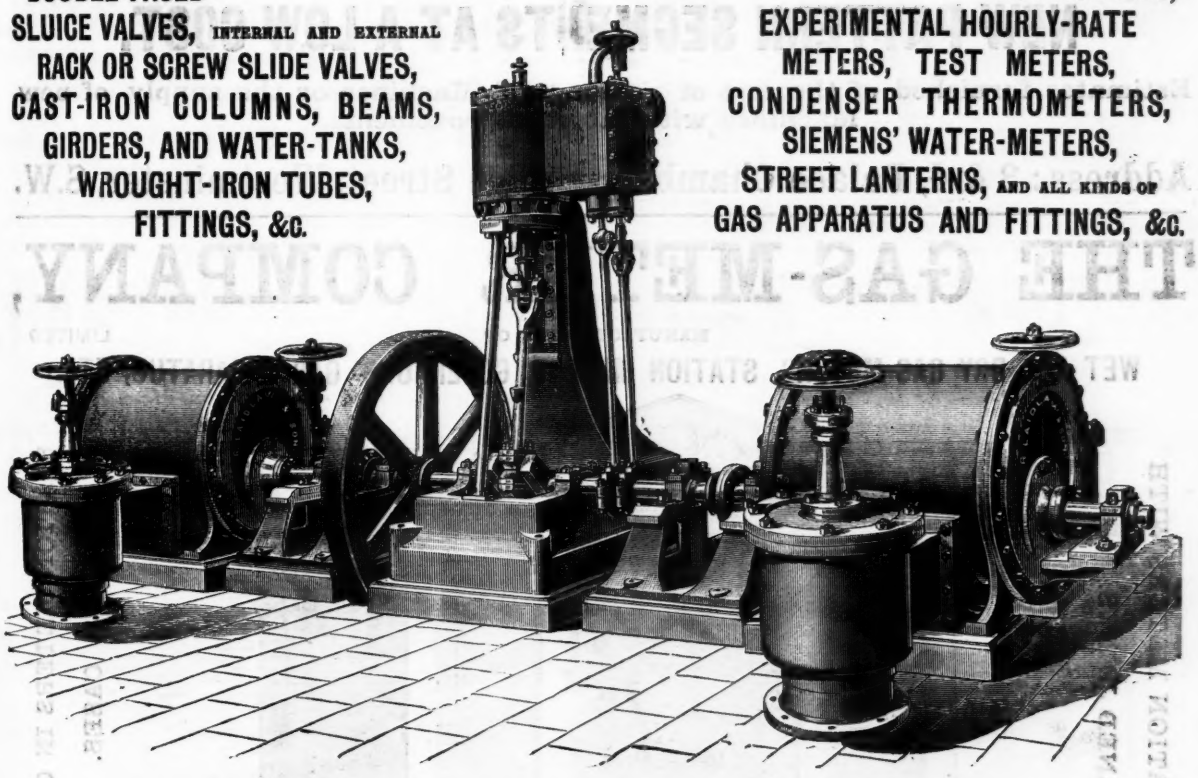

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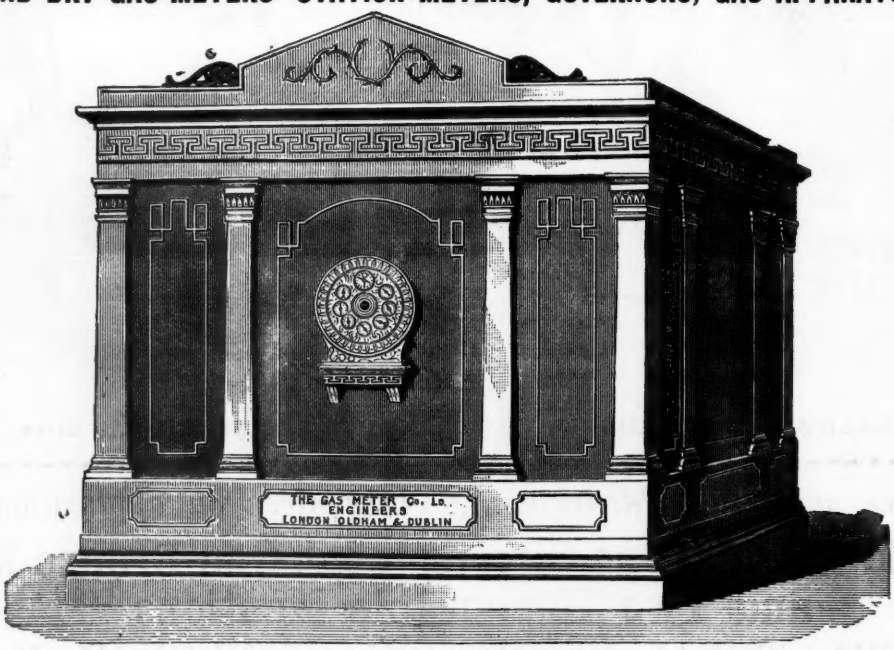


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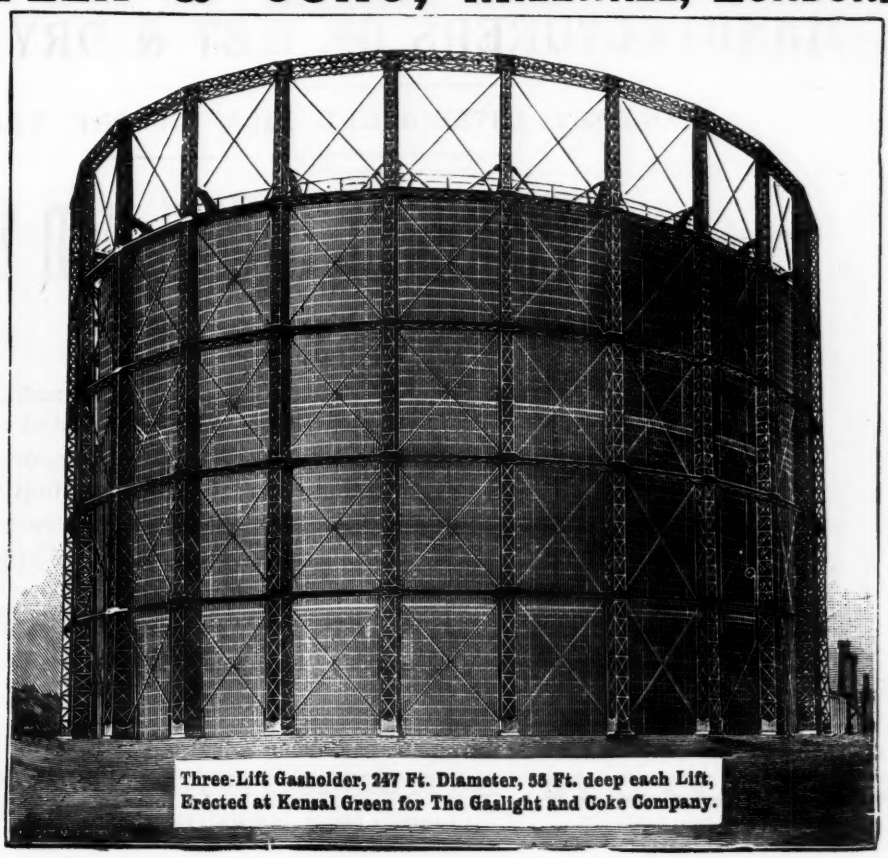

Three-Lift Gasholder, 247 Ft. Diameter, 55 Ft. deep each Lift, Erected at Kensal Green for The Gaslight and Coke Company.

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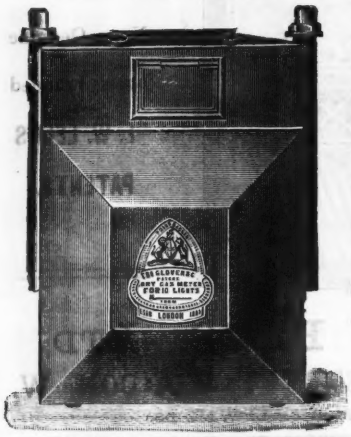

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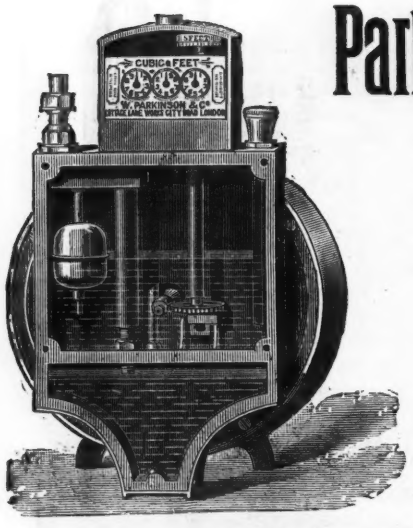
OLDEST ESTABLISHED FIRM IN THE TRADE.

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Works with very little friction.

Will stand very high pressures.

Cannot possibly be shut off by sudden increase of pressure; the float being affected by outlet gas only.

Allows for loss of water by evaporation without materially affecting the registration or shutting off the gas.

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THE
# JOURNAL OF GAS LIGHTING,
## WATER SUPPLY, & SANITARY IMPROVEMENT.

*TUESDAY, APRIL 10, 1894.*

### Two Gas Engineering Papers.

THE literature of gas engineering has been enriched during the past week by a solid piece of work by Mr. Charles Hunt, in the form of a paper on "The Construction of Gas-Works," read before the Institution of Civil Engineers; and also by a comparatively short paper on "Gasholder Construction," read by Mr. E. Lloyd Pease before the Society of Engineers. To take the latter production first, it is hardly necessary to remark that the bulk of the paper, an abstract of which was given in our last issue, was devoted to an explanation of the author's wire-rope system of gasholder guiding. The paper was illustrated by numerous models, showing the operation of this system, and helping to demonstrate to the audience how gasholders in general are maintained in the position of unstable equilibrium which is their normal state while working. It will occur to readers of the paper who have experience of the matter that the root-idea of all modern progress in the construction of gasholders is that of regarding the holder when out of the ground as a cantilever. Very few ideas in connection with gas-works construction have been more fruitful than this. It would be incorrect, however, to assert that gasholders are not to be regarded in any other light than as cantilevers; for it is equally accurate to treat them for some purposes as unstable floating bodies stayed from toppling over, either by struts or by ties. Even if they are regarded as floating bodies, however, it is impossible to make light of the office performed by the bottom rollers, which are incontrovertibly the chief agents in maintaining the holder in position. These rollers could not do what is necessary alone—this is undeniable; but it is equally true that they are the prime consideration in rendering gasholders safe. Mr. Hunt had something pertinent to say upon this head. He ascribed the modern advancement of gasholder construction to two considerations—the abandonment of trussing the roof, and the discovery of the uselessness of a heavy guide-framing. This is a perfectly just view; but it is desirable, for the sake of clearness, to point out that of these two factors in gasholder development one is old and the other new. Gasholders without roof-framing or girdering are found among the oldest works of the kind; but, as in many other matters, it has been a point of modern progress in gasholder construction to systematize the hap-hazard hints of old workers. The original constructors of gasholders, however, never thought of them as being, under a certain aspect, cantilevers; and so they gave no hint of the conditions under which the reduction of standing guide-framing has been shown to be feasible.

One remark of Mr. Hunt's upon the subject of gasholder stability is deserving of special attention. He said that Mr. G. Livesey and Messrs. Gadd and Mason (to which names that of Mr. Pease may be added) have shown that "gasholders as ordinarily constructed possess stability "which only requires to be somewhat augmented to "render them almost wholly independent of external "support." This stability, as we have argued over and over again in articles upon the subject, is the stability of balance. Everybody knows that a gasholder, when raised so far out of its tank as to lift the centre of gravity out of the water, is an unstable body. It would be unstable if it only possessed feather weight; it is in the same state though weighing perhaps hundreds of tons. But it is possible to balance a pole on end, and this is what every gasholder builder does; and a very stumpy pole it is, as a rule. A pile of three pennies one on top of another does not look a very rickety figure; yet this, as Mr. Livesey has remarked, would represent the proportions of width to height of many a gasholder. What the gasholder builder has to do is to keep the structure in balance; and the more perfectly this is accomplished—the less opportunity there is presented to the vessel to let its axis of figure deviate from the perpendicular—the greater will be the safety of the holder.

Mr. Hunt's paper, when published in the Transactions of the Institution, will be found to be an able review of the progress that has been made in gas-works construction since Mr. H. E. Jones's paper of 1875. As the schoolboy observed in commencing an essay upon the Deluge, "a good deal has happened since then." Mr. Hunt treated gas-works first as factories in which heavy masses of material are required to be moved about, next as centres of chemical industry, and lastly as fields for the engineering constructor. That the paper is full of good, substantial matter, is only what might be expected of Mr. Hunt. As a matter of fact, it is as full of point as an egg is of meat; and it gives in the reading of it an impression of absolute candour on the author's part. The worst of it is that, owing to the distinctly selfish policy of the Council of the Institution in reserving the publication of papers accepted by them for their own Transactions, which only appear at long intervals, we shall not be able to give our readers the full benefit of Mr. Hunt's deliverance. It is questionable whether the Institution gains anything by this antiquated policy; it is certain that both the authors of papers and the technical public to whom they appeal lose thereby. It is a pretty fiction that all the engineering talent of the country gathers on Tuesday evenings during the session in the Great George Street theatre; but it is a delusion. We doubt if half-a-dozen gas engineers—members of a necessarily scattered clan—could make it convenient to hear Mr. Hunt's paper read. If he had this proportion of appreciative listeners, among the railway men, machinists, and electricians who constitute the normal Tuesday night audience at the Institution, they must attend a week later if they wish to say

anything upon a point raised. And even then they may not be able to attract the notice of the Chair. After some months, when the Transactions appear, the matter will have become stale; and nobody will take the trouble to warm it up again. There are many points in Mr. Hunt's paper which, if it could be circulated while fresh among technicians, would arouse discussion; but these will probably escape notice since the full text will only appear in the "decent obscurity" of the Institution Transactions. This is a pity; because discussion is to a paper what cross-examination is to evidence adduced in a Court of Law; and Mr. Hunt, of all men, is not one to seek the false protection of an *ex parte* statement whenever he has a debateable point of professional opinion to express.

### The Commercial Company's Meeting.

VERY little that calls for extended comment passed at the meeting of the Commercial Gas Company last Thursday. This was the Jubilee meeting of the Company; and the Chairman (Mr. J. Blacket Gill) improved the occasion by reminding the proprietors and the public of the extent to which gas has been cheapened since the early days of the industry. This is a kind of exercise in which chairmen of gas committees of local authorities are very fond of indulging, with the object of impressing their constituents with a due sense of the splendid advantages accruing from the municipalization of gas supply. The truth is, of course, that municipalization has nothing at all to do with the result, which, as in the Commercial Company's case, is attributable to technical progress, the increase of business, and the cheapness of money. While all the new capital required by Gas Companies costs them little more than four per cent. on the average of stock and loans, and Municipalities have to set aside quite as much for interest and redemption, there is nothing to choose on this head between the two orders of ownership. Mr. H. E. Jones, the Engineer and General Manager of the Company, made a few pointed remarks to the shareholders, as he generally does, about some interesting aspects of their business. He showed, by reference to the number of consumers per mile of main in town and in the provinces, that there should be plenty of room for increased consumption even in a closed district like that of the Commercial; and he also spoke hopefully of the prospect of the "coin" meter connection now being opened up. Neither Mr. Jones nor the Chairman, who also mentioned this matter, was able to speak definitely as to the profit to be derived from this class of consumption; but there can be no disputing the wisdom that would extend the popularity of gas among the people at large. It is to be noticed that at last the Commercial Company have fallen into line with their neighbours, and now sell their coke by weight.

### Opposition to the Bill of the Plymouth Gas Company.

THERE should be some interesting matter brought out in the Committee on the Bill of the Plymouth Gas Company, which, as already notified, is opposed by the Corporation. In their petition, the Corporation traverse the whole scope and intention of the measure pretty thoroughly; beginning with the statement in the preamble referring to capital, and ending with the proposal to acquire electric lighting powers. In our previous comment upon this Bill, we remarked upon the obscurity of the preamble in regard to the existing capital powers; and it is not surprising that the advisers of the Corporation should have put their finger upon the same blot. It is not a very important point, perhaps; but a preamble ought to be free from all suspicion of ambiguity. It was to be expected that the Corporation would assert that the Company are applying for too much additional money. It does not appear that any objection is taken to the proposal to reduce and consolidate the capital of the undertaking upon a 5 per cent. basis; but an attack is to be made upon the initial price, which is alleged to be too high, having regard to the special circumstances of the case. The Corporation also demand that the standard of illuminating power should be raised from 14 to 16 candles, which will probably end in a compromise for 15 candles. Better provision is asked for with regard to testing for illuminating power and for purity; and, of course, strenuous objection is made to the electric lighting clause, which was always hopeless. There is nothing in the petition that cannot be fairly met by the promoters of the Bill; but, as already observed, the evidence for and against the disputed claims should contain a valuable exposition of the principles of gas supply as brought down to date.

### The Nationalization of Mining Royalties.

IT is a common observation that delusions which have once taken hold of persons of stronger prejudices than judgment die hard. It might have been thought, for instance, that if there was an idea connected with industrial regulation which had been definitely exploded, it was that which ascribed to royalty rents and wayleaves any evil influence upon the profits and wages of those engaged in the coal-mining industry that legislation could be invoked to remove. Yet, notwithstanding the fact that a strong Royal Commission has very recently made a long and laborious investigation into the whole subject, and has reported against radically interfering by legislation with the existing system, Mr. S. Woods occupied the time of the House of Commons on Friday last with a motion designed to reverse the finding of the Commission, and in favour of the acquisition by the State of mining royalties and wayleaves. This sort of thing is a sad illustration of the unbusinesslike tendencies which are so liable to be manifested by, and to mar the usefulness of, so-called practical men, who in these times are sent to Parliament to advance the interests of particular classes in the community. The House of Commons faithfully represents the character of the nation in the matter of the treatment of alleged grievances, and of those who bring them into the light of day. Nobody with a real grievance ever appeals in vain to the attention of the House; and if sufficient cause can be shown, there is never any difficulty in having the subject inquired into by a competent Commission. This course was followed with regard to the question of mining royalties, which was referred to a singularly able body of investigators, among whom were included three working miners—men who had for years been associated with the representation of the mining interest in and out of Parliament. If such a proceeding is not calculated to dispose of any question of this kind, the sooner the expenditure of public time and public money upon Royal Commissions is abandoned the better it will be. There must be some means of arriving at a degree of finality in the treatment of practical questions of the kind which will satisfy sensible men; and if there is no trusting a Royal Commission to get at the truth of a matter, let some other method be tried. The majority of people, however, do trust Royal Commissions; and the average Member of Parliament especially is not to be easily persuaded to set his own knowledge higher than the information obtained by properly constituted bodies of this character. The gas industry is vitally concerned with everything that controls the cost of coal; and we are inclined to hold with the Home Secretary that there is much in the actual regulation of the coal-mining industry which might be susceptible of improvement. The Royal Commission made several recommendations aiming at the removal of some of the disadvantages under which certain mines are at present worked, and which undoubtedly in several cases affect the price of coal. As soon as the exigencies of public business permit, these suggestions should be acted upon. The Home Secretary promised that, so far as the Government are able, this business shall be attended to; but, unhappily for the country, there is little prospect of the time of Parliament being available for the performance of practical work of this kind, while the discussion of vague and visionary schemes has superior attractions for members who ought to set an example of matter-of-fact common sense.

### Betterment in the Commons.

IT cannot be said that the discussion of the Betterment principle in the House of Commons on Tuesday last was worthy either of the subject or the place. The subject was brought on by the order for the second reading of the Bill which the London County Council are this year promoting for authorizing the making of southern approaches to the Tower Bridge. Before the debate was ended, however, reference was made, as was inevitable, to the Manchester Corporation Bill containing the same suggestion for a plan of taxation. In the end, the measure was allowed to pass the second reading without opposition, so that the proposals of the London County Council will go before a Committee in the usual way. The Bill was criticized by several members, on the familiar grounds. One member

objected, in the usual terms, to making a change in methods of taxation except by a Public Bill; but the objection was fairly met by the consideration that, while it would be extremely difficult, by any Public Act, to lay down principles capable of embracing the variety of cases occurring in practice, it may be possible to do substantial justice in a particular instance. We confess to a desire to see this question dealt with in a proper spirit. There is much to be said about Betterment; there is something to be urged about Worsement; it is wrong to speak lightly of Recoupment. Properties increase as well as decrease in value from a variety of causes—some permanent, others temporary. It might be thought that, before Parliament is asked to legislate upon a project of taxation, some attempt should be made to explain what is desired, and how the object is to be attained. This, however, is not the case in regard to Betterment. Instead of treating the matter on its merits, the House of Commons has regard only to considerations of who is identified with it. Last Tuesday, the House appeared to be paralyzed by the fact that, while the Progressive Party of the London County Council are promoting the legalization of the Betterment principle in the case of the Tower Bridge Approach Bill, the Manchester Corporation Bill bears the name of the leader of the Opposition. To the ordinary run of man, it would appear that the right course in matters of this kind would be to ascertain generally what difference, if any, a proposed town improvement might be calculated to make in the circumstances of individuals, and make allowances accordingly. But it is admitted on all hands that no such general compensation could possibly be made, even if everybody concerned were to act perfectly honourably. There never was a town improvement made yet that did not hurt somebody; but this consideration has not weighed with the improving authority. Crudely stated, the advocates of Betterment have no other idea than that of making the owners of property that can be shown to be benefited by a town improvement contribute towards the expenses of their own enriching. Sir John Lubbock says that, under the present scheme of the County Council, no property can be taxed unless it can be shown to be materially improved. The bearings of this observation lie in its application; and it will be interesting to see how the operation of the principle is explained to the Committee.

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**Mr. F. W. Cross,** formerly of Hong Kong, has obtained the appointment of Manager of the Wellington (Salop) Coal and Gas Company, which was recently advertised in the JOURNAL.

**Death of M. Jablochkoff.**—According to a Reuter telegram sent from St. Petersburg last Friday, M. Paul Jablochkoff, the Russian electrician, who was the first to solve the problem of dividing the electric current, and applying it to public lighting by means of the now well-known "candle" which bears his name, has lately died at Saratov. This system of lighting, it will be remembered, was installed in May, 1878, in the Avenue de l'Opéra, Paris. It soon attracted attention; and trials of it were made on the Thames Embankment and elsewhere. Though the electric "candle" will be the invention by which M. Jablochkoff will be best remembered, this was by no means his only invention in connection with electrical science. He was born in 1847; and he was an officer in the Russian Army.

**Death of Mr. John Allan.**—It was with much regret that we learnt, last Friday, of the death on the morning of that day, after a short illness, of Mr. John Allan, Proprietor and Editor of the *Gas World*. Mr. Allan was last at his office on the 29th ult., when he was so very unwell as to necessitate his return home. We understand that he was attacked by influenza, which gave rise to serious hepatic troubles, to which he succumbed. Deceased was the eldest son of Mr. Andrew Allan, of Hamilton; and he entered the office of the *Hamilton Advertiser* as a compositor. Having qualified himself for a better situation, he rose to be one of the reporting staff; subsequently acting in a similar capacity on the *Edinburgh Courant* and the *Edinburgh Daily Review*. He afterwards became the Court of Session reporter for the *Glasgow Herald;* and it was during his occupancy of this position that he was engaged by the Committee of the North British Association of Gas Managers to report their proceedings. This brought him for the first time into connection with the gas industry. Towards the close of the seventies, he started in Edinburgh the *Journal of Artificial Light;* but the venture was not very successful, and the publication was soon discontinued. Mr. Allan then accepted the appointment of Edinburgh Correspondent of the JOURNAL; and this position he filled until circumstances, to which it is unnecessary to refer now, led him to relinquish it in order to devote himself to the enterprise with which he was associated for the rest of his life. Mr. Allan was 50 years of age. The funeral took place yesterday at the New Southgate Cemetery.

## WATER AND SANITARY AFFAIRS.

"MERE opposition to the applications of the Companies "by the Council must be followed by certain and ignomi- "nious defeat." The words of Mr. Binnie are verified. In the predicted defeat, the present Ministry involved themselves, by acting as the champions of the London County Council on the question of the water supply when the Bill of the East London Company came on for its second reading last Thursday. As if by way of omen, Mr. James Stuart stumbled at the close of his opening speech, and brought down the laughter of the House by declaring that, for the reasons he had given, he moved "that the Bill be "read a second time." So it came to pass; and though the majority in favour of the measure was but one, there was the portentous fact that the decision went in the very teeth of the Government, and was a practical condemnation of the policy pursued by the County Council. These strangely allied powers were placed under censure by the tenor of the debate, as well as by the vote of the House. The question to be dealt with was one of vital consequence. It was clearly shown that a rapidly increasing population, inhabiting that part of the East London district which lies outside the jurisdiction of the Council, could not receive its due supply of water unless the Company obtained additional capital wherewith to defray the cost of the requisite works. But it will be seen that the debate took a wider sweep than this, and very properly so. The whole water supply of London came within the scope of the discussion; and opposition to the Bill took the form of a request that "another year" should be allowed to the Council to consider the report of the Royal Commission, so that they might come forward with what Mr. Shaw Lefevre designated as "a definite scheme and a "definite policy." But we may ask, in terms applied some time ago to another subject: "Why should London "wait?" The great city wants water, and must have it. The policy of the Council is evident enough already—it is to get possession of the Metropolitan Water Supply on such terms as will aid their funds with a large surplus revenue—as large as possible. The "definite "scheme" is to cripple the Water Companies, and to make them surrender at discretion. If the Council were anxious that London or its environs should not suffer for want of water, they would urge the Companies to adopt such measures as would meet the want, rather than try every manœuvre to hold them back. The Companies are accused of seeking to benefit their shareholders. It is hardly to be expected that they would seek to injure them. But whom are the County Council going to benefit? If they could have their own way, many innocent people would be the worse for it. Had the East London Bill been rejected last week, the same fate would have awaited the Southwark and Vauxhall Bill to-morrow. That Bill affects an outer area as well as an inner one, and proposes works which ought to have been taken in hand two or three years ago. The Company have waited for the report of the Royal Commission; and they now come forward with a plan which, whatever Mr. Shaw Lefevre may say to the contrary, is in practical accordance with the recommendations contained in that report.

Mr. Stuart, in the course of his speech for the rejection of the East London Bill, stated that the County Council had offered to treat with the Companies for acquiring their undertakings on fair and reasonable terms, but that "the Companies had refused to negotiate." The cries of dissent which met this statement induced the speaker to amend his assertion by saying that the Companies "did "not accept the basis of negotiation which the County "Council proposed." "But," he added, "the Companies "did not make any counter-proposals." How could they? No proposals were practicable unless "the basis of nego- "tiation" underwent a change. The specification ran thus: "Provided that no monopoly right on the part of "the Companies be recognized." This created a gulf which effectually cut off all communication between the Council and the Companies. Beyond this, there were other conditions tending to complicate the affair, and calculated to make the Companies the victims of a foregone conclusion. The pretence of negotiation put forth by the Council was obviously designed to improve the chances of opposition to the Companies' Bills; but the stratagem was fairy exposed in Parliament, and was ably

dealt with next day in the editorial columns of *The Times*. But that the Council see the necessity of purchasing the existing works is evident enough from their constant effort to prevent extension or improvement which it is thought may add to the capital value of the undertakings. The plea that another year should be granted to the Council, in which to propose a policy and a plan, is to be understood in another light. We turn to the *Daily Chronicle*—the trusted oracle of Spring Gardens—and there we meet with the argument that the Council should be allowed "a reasonable time," not to prepare a grand scheme for a Welsh supply, but "for a fair bargain with the "Water Companies." Of course, in the "reasonable "time" thus sought, the Companies are to be harassed, until they can be brought down on their knees and induced to capitulate. The *Chronicle* has the further audacity to say that the Council were "perfectly willing to meet" the Companies, so that they "could have had everything that "was necessary to the supply of the mechanical needs of "London." These "mechanical needs" were to be met by an "interim arrangement." What does the *Chronicle* mean? All this is new to us. Perhaps the same inspired organ will also explain what Mr. Stuart's instruction to the Committee on the subject of the Conservancy Bill is intended to accomplish. It might very well cover an attempt to cancel those arrangements by which the Conservators have given the Companies power to abstract an extra 20 million gallons per day from the Thames. Certainly, such an instruction, if acted on, would take out the very heart of the Southwark and Vauxhall Bill. In a letter to *The Times* on Saturday, Mr. Walter Hunter, when replying to Mr. Bassett Hopkins, stated that the Southwark and Vauxhall Company have "taken action quite "independently of the other Thames Companies." As justifying reliance on the present sources of supply, Mr. Hunter quotes the report of the Royal Commissioners demonstrating the ample flow of the Thames, and cites the statements of eminent geologists as to the large quantity available from the chalk; the entire evidence serving to show "that the wants of London as to water "supply are probably secured for the next century." As to the cost of the Staines scheme, Mr. Hunter says the estimates have again been checked, and their sufficiency can be proved before any competent tribunal.

The half-yearly meeting of the East London Company last Thursday was almost simultaneous with the debate in the House of Commons on the Company's Water Bill. We can apprehend that the thoughts of the shareholders occasionally wandered from St. Helen's Place to Westminster; and Mr. Hankey very naturally inquired of the Chairman when they were likely to know the fate of their application to Parliament. Mr. Banbury signified that the die would soon be cast. The merits of the Bill were strikingly illustrated by the remarks which fell from the Chair as to the necessity of providing an enlarged supply of water. The public interests at stake were shown by the fact that a very large and growing demand was being made in that part of the Company's district which lies outside the limits of the Metropolis. Independent testimony, of a most decided character, to the same effect, appeared two days before in a letter to *The Times* from the Chairman of the Essex County Council. The reality of the demand was also shown by the Chairman's statement that the new services in their outside area last year were equivalent to the requirements of a town larger than Chelmsford. The process is still going on—the population increasing "by leaps and bounds;" while the London County Council affect to believe all this means nothing. Happily the House of Commons has for once been wiser than the Council; and we may hope the Company will soon be placed in a position to furnish an adequate supply. It remains to be noticed that, at the meeting of the County Council to-day, a report will be presented from the Parliamentary Committee, recommending "That the "London County Council Water Bill be not further pro-"ceeded with," having regard to observations which fell from members of the Government during the recent debate "as to the necessity of the Council promoting some more "practical measure." "The debate" on the second reading of the East London Water Bill "and other Water Bills" is mentioned as having "largely diminished" the prospect of being able to proceed with the Council's Bill. Would "the debate" have frightened the Council had there been no second reading?

# ESSAYS, COMMENTARIES, AND REVIEWS.

## GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 668.)

THE general tendency on the Stock Exchange continues very bright and cheerful; and a genuine revival seems assured. The past week has not been without its ephemeral variations—at times firm and quiet, at others dull and inactive; and a day full of considerable advance would be followed by one of profit-snapping. Despite these fluctuations, however, which, after all, are normal and natural, there is a good steady improvement in point of confidence in the future; and the public are bringing into the markets all their accumulations of cash. Almost every market has consequently benefited; and prices, on the whole, show out well all round. Gilt-edged securities have, of course, been strong; home rails were rather between the conflicting influences of good trade prospects and the chances of another coal difficulty; silver has fluctuated, and has thus agitated its dependents; but, with these exceptions, tendencies have been favourable. The Money Market is in a very easy condition. Some occupation for it will be furnished by the settlement this week; but there is ample and to spare for all possible requirements. The Gas Market has shown much more activity, and rules extremely firm; several quotations having made advances. The chief issue, however—Gaslight "A"—has fallen back a point. It had been hanging fire for the last week or two; and the agitation in regard to the price charged for gas has not done it any good. The secured issues were very busy, and realized good figures; but the 6 per cent. debenture was the only one to advance in price. South Metropolitans continue very strong; and the "A" has risen again. Nothing was done in Commercials; there being no sellers. Suburbans and Provincials exhibit their usual quietude, and they are very steady all round; while Alliance and Dublin and Bristol have gone up in price. Among Continentals, hardly anything was touched, except Imperial, which was in good demand, and improved in view of the utter collapse of the outrageous strike at the Vienna station. Of the rest, there is scarcely anything to record; but Monte Video has made a further advance. Water stocks have been very inactive. But one or two have risen in value; and the defeat of the London County Council, backed by the Government of their late Chairman, over the East London and West Middlesex Bills has made a good impression.

The daily operations were: Gas was quiet at the opening; and little was done, except in South Metropolitan "A" and Imperial Continental. Monte Video rose ½. Activity began to quicken on Tuesday; and Imperial Continental rose 3. Business was brisk on Wednesday—conspicuously in Gaslights and Imperial Continental. Bristol improved 2; and Alliance and Dublin, ½. Thursday was also a fairly active day; and still the general tendency was upward. Gaslight 6 per cent. debenture stock advanced 2. Southwark ordinary also rose 2. Friday was rather quieter; and Gaslight "A" fell 1. Grand Junction gained 1. Saturday was strong, and brisker than usual. South Metropolitan "A" advanced 2.

## ELECTRIC LIGHTING MEMORANDA.

**A New Electrical Storeage Speculation—Professor Fleming on Electric Lighting—Mr. Vail on the Electrolysis of Pipes—The Prospects of the Reading Electric Supply Company.**

AFTER a prolonged suspension of this kind of financial business an electrical speculation has been put upon the market. The subscription list was opened last Thursday of the International Electric Storeage, Limited—the word "company" does not appear in the title—for what in these days must be termed the modest capital of £200,000, to be applied for acquiring and working the Theryc-Oblasser accumulator patents. Major Flood Page, the Deputy-Chairman of the Edison-Swan United Electric Lighting Company, is Chairman of the Board, and Professor J. A. Fleming is the Consulting Electrical Engineer. It may be thought that the experience which has already been gained in regard to electrical accumulators is hardly of a character to inspire much confidence in the commercial future of any appliance of the kind; and one naturally turns to the prospectus of the new Company for information tending to answer the question as to how the Theryc-Oblasser article is superior to the other makes of accumulators already in the market. Extracts from a report of Dr. Fleming upon some sample batteries manufactured in accordance with the Theryc-Oblasser patents are given, which testify that, in Dr. Fleming's opinion, these batteries may be more durable than others, that the plates permit heavy charges to be taken from them without apparent injury, and that the batteries look likely to stand knocking about fairly well. Mr. Schanschieff, the Company's Engineer, also reports that the capacity of the battery per pound net weight is about three times that of any other battery; and that on this and other accounts he is prepared to say that "it marks an epoch in the application of electricity to practical uses." It is to be gathered that the principal application of these batteries is to be for railway and tramway traction purposes, although they are stated to be useful for lighting vehicles. It remains to be seen whether these recommendations, such as

they are, are sufficient to attract public support to a venture which has little else to justify it.

While mentioning the name of Professor Fleming, it may be remarked that he has been appointed to lecture at the Royal Institution on "Electric Illumination;" and he accordingly gave last Tuesday the first of a series of four lectures devoted to the subject. Dr. Fleming stated that there are now something like 700,000 incandescent electric lamps in use in London, and about 425,000 in the provinces. These are very handsome figures; and it were a pity to inquire over closely into the means by which they have been arrived at. The total length of electric underground wires now laid was also put by the lecturer at 700 miles, which gives a very comfortable proportion of lamps to mileage of main. This progress is chiefly the work of the last five years; and far be it from us to utter remarks detracting from the credit due to the initiative and energy of those to whose labours so substantial a result is due. A good deal of this first lecture was devoted to photometrical matters, which served to introduce the subject of comparative means and degrees of lighting. Dr. Fleming described the "candle-foot," or the brilliancy of lighting due to the flame of a standard candle at a distance of one foot from the surface illuminated, as the least illumination required for comfortable reading. Bright moonlight is only about one-fiftieth of a candle-foot; while diffused daylight may be anything, from 30 to 40 candle-feet. Dr. Fleming also gave some figures showing the comparative richness in luminous rays of different incandescent bodies. Thus, while of all the radiations from the flame of a candle only 3 per cent. are luminous, the luminous duty of a gas-flame is 4 per cent., that of the incandescent lamp filament reaches 10 per cent., of the arc light 20 per cent., of burning magnesium 15 per cent. Far richer in light as compared with heat rays is the glow of a vacuum tube; while that of the Cuban firefly is superior to all. In making these comparisons, Dr. Fleming could not have taken into consideration the effect of gas at its best, as exhibited in a good regenerative or a new incandescent gas-burner. It is again to be remarked how deeply electricians are committed to the trick of setting the best incandescent electric lamps against ordinary or admittedly poor gas-burners, even when the result they desire to bring out is merely a point of scientific interest.

We have received from the author, Mr. J. H. Vail, a copy of a paper on "The Importance of Complete Metallic Circuit for Electric Railways," read before the last convention of the National Electric Light Association. Mr. Vail is connected with a New York firm of electrical engineers; and he claims to have made a profound study of the electrolytic action of currents used in electric railway systems upon gas and water mains, with a view to its prevention. He illustrates a case of a 6-inch water-main perforated in several places by this means in the short space of 2½ years. Another piece of pipe was rendered useless in six months. The remedy for this mischief is, as stated by Mr. Vail, the adoption of the complete metallic circuit of such low resistance that the current will circulate freely from pole to pole of the dynamo, and thus have no inducement to follow such conductors as gas and water pipes. The recently issued Board of Trade regulations in regard to this matter aim at ensuring that, if any leakage or return current passes through the earth, it shall enter gas and water pipes, and not leave them except through proper metallic conductors, whereby corrosion will be prevented. Mr. Vail recommends the use of insulated feeders, and so do the Board of Trade. When discussing these regulations, the *Electrician* expressed the hope that "owners of gas and water pipes will soon recognize the simple scientific fact that their greatest security lies in ample connection with the earthed negative pole of the circuit."

The prospectus of the Reading Electric Supply Company has been issued, and whoever wishes to put down his money for the promising work of lighting this little town by electricity will have plenty of time to think it over, since the subscription list is to remain open until this day week. The fact of a central station electric lighting venture having actually put forward an appeal for public money is one of the most encouraging signs of the revival of business that we have seen for a long time. There must be plenty of money awaiting investment; and why should not some of it be engaged in this enterprise? Moreover, only £75,000 is wanted for the purpose, of which not more than £45,000 is called for in the shape of the first issue. The Company is a local affair—all the Directors being Reading men. A Provisional Order has been obtained by the Company in co-operation with the Corporation, from which we opine that the project is a Corporation product, intended probably to bring some sort of pressure to bear upon the Gas Company. It contemplates the acquisition of the electric lighting concern set up in Reading so long ago as 1889 by Messrs. Laing, Wharton, and Down, for the sum of £15,033 in cash, which, we should imagine, the latter firm will be very glad to get. The Directors have put themselves in order by consulting Professor Silvanus P. Thompson as to the laying out of the undertaking upon a permanent basis; and this authority comforts them with the estimate of a yearly net profit of £3910, to be available at some future date for the purpose of dividend. For the first two years, however, he thinks they may expect to realize upon their contemplated initial outlay of £42,300 a net profit of £1400 a year. All we can say about this is that the investors in the majority of similar ventures of this standing would be glad to get anything approaching such a return. We notice that Professor Thompson commits himself to an estimated revenue of 10s. per annum for every 8-candle power lamp. Speaking for the Notting Hill district, where people sit up at least as late as they do in Reading, Professor Crookes said at the last meeting of the Company that the return per lamp was only 6s. 6d. per annum. This would take most of the gilt from Professor Thompson's bit of Reading "gingerbread."

## LORD SHAND ON INDUSTRIAL CONCILIATION.

THE most interesting of the public affairs that were offered for notice last week as "contemporary developments" was the meeting of the Miners' Board of Conciliation, under the presidency, for the first time, of Lord Shand, the Chairman nominated by the Speaker of the House of Commons. As we had occasion to remark in our editorial columns last week, the position and prospects of the coal trade are as unsettled as ever; and of all the various expedients that are or have been suggested or put into practice with the object of strengthening the coal markets of the country, not one appears likely to command success. It was particularly opportune, therefore, that Lord Shand should have put himself and the Conciliation Board in evidence; since, whatever else may be said of it, this institution is not based upon any principle inimical to that science of Political Economy in the cultivation of which all wise and well-instructed people must continue to seek for safe rules for the government of the coal as of all other industries. Lord Shand is, in a sense, as much of a public institution as the organization over which he has undertaken to preside. The same may, indeed, be said of all Judges of the High Courts of Justice; for these personages are in their public employments more than individuals—representing as they do a tradition and a prestige that have grown through the ages, until they overshadow the mere personality through which the law is pronounced and applied to particular instances. The inaugural address delivered by Lord Shand on the historic occasion now to be noticed consequently deserves the closest study on the part of all who are concerned in industrial affairs, of whatever variety; because it constitutes in no unworthy fashion the charter of a new dispensation, in which it may be hoped that ordered reasoning and fair compromise will prevail as between the two orders of the industrial community, to the banishment of those influences which culminated in last year's disastrous conflict. If the country is ever to see the last of miners' locks-out, gas stokers' strikes, and of the misunderstandings and ignorances of which such outbreaks are the miserable fruit—nay, if we are to keep clear of worse, even of such tumults as the Homestead riots—it will only be by supporting the great movement of which Lord Shand is the living embodiment. Not that this is the end to be sought; for it is in truth only a means to the end. But it is a means worth trial to the infinity of patient forbearance.

Lord Shand's inaugural address was as noteworthy for the apt graciousness and simplicity of the style as for the weight of the matter. The speaker began by disclaiming any intention of making a formal speech; and he then proceeded to deal with the most momentous considerations in a free colloquial style, which must have manifested to such of his hearers as were able to form a judgment on the point, how complete was his mastery of the subject. For your neophyte is ever a ranter; and it is only the master-mind that can present views of great topics in the easy language which is so delusively called the "elementary" style. It is unfortunately only too common for people possessing a smattering acquaintance with subjects, to think they are thereby enabled to instruct others in such matters in what they fondly regard as an elementary manner. But, of a truth, it is the grasp of, and power for, expounding the elementals of any subject which is the last thing to be acquired by students of it; and many never do arrive at this mastery. Hence it is that such wild work is made in regard to politico-economical teaching by mass-meeting orators who, like John Burns, have picked up their little notions in converse with the half-informed disciples of German and French dreamers.

The first serious thing said by Lord Shand last Tuesday was with reference to a question of definition. He asked, as if speaking to himself, whether the members of what are called Conciliation Boards realize the meaning and the force of the word "conciliation." It was a bit of common sense almost amounting to genius that inspired the learned speaker to draw attention thus to the supreme importance of the study of words. This is about the last thing self-styled practical men trouble themselves over; and consequently they run blindfold into all sorts of misunderstandings. "Conciliation," said the President, "in my mind means concession;" and if this was not the view of his hearers, he asked why they were there. The term implies a process of give-and-take—a readiness to look at questions with no preconceptions; and it also carries an implication of readiness to abide by the issue. This latter aspect of the term, as *The Times* pointed out, was hardly insisted upon sufficiently by Lord Shand; but it must be admitted that the President was standing upon delicate ground, and dared not talk, to his very mixed audience, too much about the meaning of words.

It is already pretty well understood that the prospect of the Miners' Conciliation Board effecting anything definite in the direction of bringing the masters and the men to see eye to eye in regard to certain problems of vital interest to both, depends upon the creation of a good understanding among the members from the outset. The formation of a body of this kind, which has no constitution beyond the good-will of the members, may be illustrated by the process of making felt. Here a handful of hairs originally quite separate from one another, and having no tendency to bind together, is thrown upon a mould and damped. At first a breath will rupture the nascent fabric; but after a little artful manipulation, directed to bringing into play a previously unexercised quality of the component hairs, the felt takes shape as a strongly-united texture. Of such is the Miners' Conciliation Board in the hands of Lord Shand. His first task is to develop the latent possibilities of cohesion existing in the heterogenous collection of delegates who have taken the first step towards union by submitting themselves to his guidance. If the delegates can only be "felted" into a coherent body commanding the support of all the members, the coal trade will be saved.

Only, in order that this beneficial result shall be achieved, much more will be required of the members of the Conciliation Board besides the initial duty of coming into conference with an open mind. After having made this point quite clear, Lord Shand went on to engage the delegates to trust in one another, so far as the production of information and matters of fact is concerned. "Of one thing I trust I may feel assured," said the President, "and that is that, in all the questions which are raised, where matters of fact are concerned, the fullest information will be frankly and cordially given upon both sides; and that you will endeavour to show, in so far as you possibly can, confidence in each other and in the statements that each makes to the other." There is a profound depth in this simply-worded aspiration, which shows clearly enough that Lord Shand is acquainted with much of the nature of the difficulties that have in past times separated employers and employed in the coal industry. He evidently knows that hitherto perfect candour of statement has not been the strongest point with either side; and he has taken the earliest opportunity for warning his friends in both parties that they must come into his Court with clean hands. It will go hard with the side that again transgresses this plain rule of procedure.

Next to the obligation of candour comes the duty of abiding by decisions fairly arrived at and clearly pronounced, no matter whether they are pleasant to both sides or only to one. As *The Times* has put it, the chief danger ahead is the mistrust of all arbitration which the men are said to have. The very term is declared to stink in the men's nostrils; they look for the very worst from an arbitrator; they instinctively rebel against his decisions, and turn upon the most trusted of their agents who should consent to sign away what they regard as their rights, in deference to the judgment of a third party. Of course, if this description of the miners' attitude towards an organization for conciliation in wages disputes, which must occasionally become also an agency for arbitration, is correct, the hope of Lord Shand's doing any good had better be dismissed at once. It is difficult, however, to take this extreme pessimist view of the situation. Here is now an opportunity for both parties to inaugurate what Lord Shand rightly calls a great experiment in a new spirit and with a new temper, which, if they exist, will make possible things that have hitherto baffled arbitrators. The experiment is to begin with the Federation miners; but it will not end with them if it succeeds. The President told his auditory that, "even in foreign countries, there is the deepest interest taken in the proceedings of the Board, and the proceedings are watched, not with a view to their limited interest only, but to what may possibly become the solution of very much larger questions in other countries by the mutually conciliatory efforts of employers and employed." At least, if the Board fail, it will not be due to any lack on the part of their first President of power or of will to show forth the gravity of the issues committed to their charge and the rightful way of dealing with them. It is so far satisfactory to learn that Mr. A. M. Chambers, on behalf of the coalowners, and Mr. B. Pickard, M.P., for the men, joined without reserve in accepting the President's expressions of opinion as engaging their approval and support. If such approval means anything at all, it is the best promise that could be given of the successful working of the Board; for the occasions of difference in an industry must be rare which will not yield to open-minded discussion, candid statement, and loyalty to a fair decision.

It is understood that at Tuesday's meeting the men's representatives offered proposals for the fixing of a minimum living wage standard at 33 per cent. above the wage rate of 1888, and a minimum selling price in contracts for railway and gas coal, and for securing a right of inquiry into owners' profits prior to any reduction of wages. Lord Shand gave his casting vote against all three proposals, which, as the business in hand was ostensibly the settlement of rules for the Board, were manifestly out of place. The fact that these suggestions should have been made on such an occasion shows at once the drift of the men, and the necessity for an impartial head to keep the deliberations of the Board within the bounds of business propriety. All these proposals will come up again, and will have to be dealt with on their merits. When in order, they will be fair matters for discussion. With regard to the notion of fixing a minimum price for railway and gas coal, there should be little difficulty in showing, to the satisfaction of an impartial mind, that, large as the consumption of coal by the railways and gas-works is, it is too small a fraction of the total demand upon the coal-fields to affect the average market price of coal by which the vast majority of miners' wages must be determined. Lord Shand may be trusted to perceive that, while gas consumers would suffer, coal miners generally would be no gainers, were all the gas coal raised in England forbidden to be sold for less than a pound a ton at the pit's mouth.

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**Death of Mr. W. Oldfield.**—The death is announced of Mr. W. Oldfield, Manager of the Goole Gas-Works. Deceased was formerly at North Bierley, and only entered upon his duties at Goole about two years ago.

**An Explanation.**—We are asked to mention that the Mr. G. Sumner who, as announced last week, has been appointed Manager of the Woking District Gas Company, Limited, is the son of the Manager of the Ilford Gas-Works; and consequently no vacancy has occurred in the managership at the latter works.

**Eastern Counties Gas Managers' Association.**—The eleventh general meeting of this Association will be held, by permission of the Mayor, in the Town Hall, Bury St. Edmunds, on Wednesday, the 18th inst. We learn from the *agenda* issued by the Honorary Secretary and Treasurer (Mr. Harry Wimhurst, of Sleaford), that the members will meet at the gas-works, and partake of luncheon at the invitation of Mr. A. Mitchell, the Manager. They will then proceed to the Town Hall for the transaction of the business. This will comprise the election of three new members—Mr. H. S. Pike, of Colchester; Mr. T. A. Guyatt, of Ely; and Mr. J. A. Smith, of Aylsham—the presentation of the report and accounts, the delivery of the Inaugural Address by the President (Mr. W. J. Carpenter, of Yarmouth), and discussions on the subjects of differential prices for gas and the charging of meter-rents. After the meeting, the members will visit the Abbey Ruins and the Botanical Gardens, and later in the day dine together at the Suffolk Hotel.

**Death of Mr. E. Sandell.**—We regret to record the death, on Monday last week, at the age of 88, of Mr. Edward Sandell. Deceased came of an old Kentish family; and though his elder brother David was connected with the gas world many years previously as Manager and Engineer of the British Gaslight Company's station at Hull, his own connection commenced about fifty years ago, with the town of his family's extraction in the midst of the hop-poles. It is now nearly thirty years since Mr. Sandell (partly at the suggestion and by the advice of the late Mr. T. G. Barlow) published his well-known "Gas Companies' Expenditure Journal;" and it is a significant fact that the grouping of the headings of accounts under the Gas-Works Clauses Act, 1871, are scheduled in the manner adopted by Mr. Sandell in his book. Though the age of deceased was very great (he could recall seeing the troops leave the City Road Barracks for the Battle of Waterloo), his work was personally attended to till within a few weeks of his end; and we have never heard of any company with whom he was associated having reason to regret their relations with him as a conscientious painstaking Accountant. We believe it must be more than thirty years since Mr. Sandell was appointed Auditor of the West Kent and Mitcham and Wimbledon Gas Companies; and many of the shareholders will regret his absence from the general meetings of these Companies, where his presence was so familiar from time almost out of mind. The interment took place at Norwood Cemetery last Friday.

**Death of Mr. Joseph Quick.**—On the 30th ult., at his residence in Clapham Park, Mr. Joseph Quick, M.Inst.C.E., the well-known Water Engineer, passed away in his 85th year. Deceased was originally Engineer to the Southwark Water Company; and after its amalgamation with the Vauxhall Water Company, in 1844, he was appointed Engineer-in-Chief to the amalgamated Company. This position he continued to occupy until 1876. He was also for many years Engineer to the Grand Junction Water Company, and for them and the Southwark and Vauxhall Company designed and carried out the important series of works for the conveyance of water from above the tidal influence of the Thames required by the Metropolis Water Act, 1852. These involved the erection of the extensive pumping establishments and reservoirs at Hampton, and the enlargement of the distributing and filtering stations at Kew Bridge, Battersea, Campden Hill, Kensington, &c. In addition to his extensive practice in London, Mr. Quick was also actively engaged in engineering works, principally hydraulic, in various parts of England. On the Continent, his name was almost a household word in connection with water supply; and it is not too much to say that in every important scheme he was in some way consulted. Among the cities abroad where his firm carried out works of water supply and drainage may be mentioned Amsterdam, Odessa, St. Petersburg, Beyrout, Saratov, Calcutta, Cape Town, &c.; and also the contemplated new works for Vienna, the designs for which were approved by the Government and Municipality in face of several opposing projects. Mr. Quick had for some years retired from the active pursuit of his profession. He is succeeded by his two sons—Mr. J. Quick, M.Inst.C.E., and Mr. E. Quick, Assoc.M.Inst.C.E.

# NOTES.

### The Protection of Iron from Rusting.

Mr. W. Thomson, of Manchester, is continuing his researches into the oxidation and corrosion of iron and steel; and he recently published some further observations on the subject in the *Journal of the Society of Chemical Industry*. According to this statement, Mr. Thomson had a number of sample pieces of thin sheet-iron, of uniform size, weighed and painted with one coat of each of the paints, and weighed again; then left for about a week exposed to the atmosphere, and again weighed. The difference between the two first weighings gave the weight of the wet paint employed, which was calculated out to the square yard of surface; while the first deducted from the third gave the weight of dry paint. The coatings thus tested upon the sample strips, which measured 4 in. by 1¾ in., varied in weight from ¾ oz. for linseed oil alone to 7 oz. for oxide of iron paint; tar weighed 1·56 oz.; solution of pitch, 1·24 oz.; red lead, 6·24 oz.; and so on. Having tried in vain the effect of spraying the samples with a saline solution, Mr. Thomson proceeded to immerse the samples in a glass vessel containing sufficient saline solution to half cover each. He observed that, after two or three days, the clear solution began to grow turbid; and in a few days more it threw down a precipitate of the peroxide of iron. Some time later on it could be observed that the iron beneath some of the coatings of paint was undergoing oxidation to a much greater extent than others. It suggested itself to Mr. Thomson that if each plate of iron were placed in a separate glass beaker with the saline solution, the turbidity of the clear liquid would be some criterion of the progress of the rusting action. This was done in the case of a second series of experiments, which went to show that this observation is just; and Mr. Thomson was able to ascertain that oxide of iron paint, white lead, and the ordinary paints of commerce, have comparatively little protective influence on iron as contrasted with red lead, for the latter showed no signs of turbidity in the saline solution after all the others had become turbid, and deposited a considerable precipitate of ferric oxide. Mr. Thomson further lays stress on the electrolytic corrosion of iron; and he suggests that, for the protection of large iron structures from this effect, it might be advisable to place a large ball of zinc in wet ground in metallic contact with the iron of the structure by means of wires, which he believes would tend materially to prevent corrosion at comparatively small cost.

### Pipe-Lifting by Expansion.

An interesting illustration, to be commended to the notice of popular lecturers, of the old aphorism that "knowledge is power," as well as of the more modern definition of science as "organized common sense in regard to things," is supplied by some recent proceedings of Mr. Howe, the Engineer of the Clay Cross Collieries. It is reported that some weeks ago the second pipe from the bottom of a 6½-inch rising pump main, 140 yards long and 30 tons in weight, in one of the Clay Cross pit shafts, broke off at the branch connecting it with the underground pumping-engine. The whole weight of the line of piping rested upon itself, so that it was a question of how to get the broken member out and replace it. Mr. Howe decided, with the concurrence of Mr. Jackson, the Manager, to lift the pipe-column by the force of expansion due to steam heat. Accordingly, a cross-beam was inserted in the shaft at a height of 60 yards from the bottom, bearing close against the defective main, and not far under one of the flange joints. The pipe being then empty, steam was turned into it at the bottom through a ½-inch pipe and regulating cock; and in the course of an hour the main had moved up 2½ inches at the point where the cross-beam was fixed. The main was then secured to the beam by strong clamps, and as soon as the weight had been taken in this way, steam was shut off; and the pipes, contracting, began to lift the broken end from the pit bottom. The broken pipe was changed for a sound one, and steam again turned on until the clamps could be taken off. The time occupied in the operation, from first turning on the steam to re-starting the pumps, was only four hours; and the operation was effected without a hitch.

### The Photometry of Beacon Lamps.

It is stated by Mr. Du Riche Preller, in a letter to *Engineering* on the photometry of beacon lights, that, owing to the elastic, unreliable, and fallacious results arrived at by calculating the luminous effect of optical lighthouse apparatus by formulæ, even those evolved by M. Allard and supposed to be accurate, the French Lighthouse Department tests the illuminating value of all its optical apparatus for oil, gas, and electric lamps exclusively by careful and oft-repeated photometric measurements. These observations are made in Paris; the apparatus to be tested being placed in the lantern of the Depôt des Phares and the observing staff and measuring instruments on the first platform of the Eiffel Tower, which is at a lineal distance of 600 yards, and has been specially adapted for the purpose. The photometers used are those of Mascart and Foucault; the unit of comparison being the standard Carcel, of 10-candle power. Thus tested, the intensity of the beam of the optical apparatus for the lighthouse of La Hève, manufactured by Messrs. Sautter, Harlé, and Co., was found to have a minimum of 23 million candles, even in the hazy and highly absorbent atmosphere of Paris. It is still arguable, however, that the ordinary language of artificial lighting is hardly applicable to determinations of the intensity of concentrated beams, in which the usual characteristic of light, of radiating as from a point in every direction, is changed for the phenomenon of a bundle of parallel rays.

# TECHNICAL RECORD.

### THE CONSTRUCTION OF GAS-WORKS.

At the Meeting of the Institution of Civil Engineers last Tuesday evening, a paper on the above subject was read by Mr. Charles Hunt, M.Inst.C.E.

The author commenced by pointing out that since Mr. H. E. Jones's paper was read before the Institution in 1875, the consumption in England of coal for gas-making purposes had risen from 5¼ million to upwards of 11 million tons. He showed that the greater output of gas which these figures indicated had been largely supplemented by conditions due to concentration of manufacture; so that while it might be safely assumed that the majority of gas-works had been doubled in capacity during the last 18 or 19 years, it was also certain that in some cases even this rate of growth had been conspicuously exceeded.

In describing the construction of gas-works of the most modern type, the author took the Windsor Street station of the Birmingham Corporation, recently completed from his designs. He explained that there the dominating idea had been unbroken railway communication to the farthest point of delivery within the works; the position of the retort-house having been made to subserve this end. In carrying it out, two series of curved lines, crossing each other in opposite directions, lead to the retort-houses. These lines are overhead, 20 feet above the ground-level, and 10 feet above the charging-floor of the retort-house; so that coal is stored in the yard to a depth of 20 feet, and in front of the retorts to about half this depth, by simply dropping it from the railway waggons. Water-carriage is available for the disposal of the coke, which is loaded at a comparatively small cost into boats brought to within a few yards of the retorts. Equal facility for loading railway waggons is afforded by a coke-loading dock, 6 feet deep, running parallel with the canal arm. This system was first adopted at Leicester, where Mr. Colson has also demonstrated the superiority of an inclined railway worked by a locomotive over a hydraulic waggon-hoist, for dealing with any large amount of traffic.

Dealing next with the delivery of the coal to the retort-house, Mr. Hunt showed that it is obviously advantageous to reduce the handling to a minimum. Where this could not be done on the level with the railway, it might, he said, be effected on the system adopted in the Glasgow Gas-Works, where an inclined railway of the ordinary gauge has been constructed from the main line siding, rising to the top of the coal-stores, 17 feet above the charging-floor of the retort-house, and worked by a small tank locomotive. Where soft coal is used, however, the breaking up resulting from dropping the coal from a height is an objection. The author cited an experiment made at the Windsor Street works, which showed that not only is the value obtained from a mixture of lumps and dust much less, but that the charge takes half as long again to work off. It thus appears desirable to ease the fall of the coal by an inclined shoot, and to select a charging-machine which requires the coal to be broken up the least. He said it might occasionally be found practicable to place coal-breakers at such an elevation as to deliver from them direct into the hoppers; but it was a matter for consideration whether it was not preferable, generally, to choose a low level for the delivery of coal for daily use, and have recourse to elevators for raising it to the required height. The cost of unloading coal delivered by water is greater than from railway trucks, and there is occasional loss through transhipment. Nevertheless, improved appliances introduced at the Nine Elms works of The Gaslight and Coke Company have reduced the cost for labour only from 4d. to ⅜d. per ton.

With regard to carbonization, the author remarked generally that it is perhaps easier to contrive economies with the material in bulk than in detail, as it has to be dealt with in the retort-house, although in the latter case the margin for saving is decidedly larger. How much coal might profitably constitute a charge, has never been definitely determined; but there is good ground for the opinion that the best all-round results are obtained from small charges combined with moderate as distinguished from very high heats. It has been generally assumed that the deficient yield of tar which usually accompanies the use of a high carbonizing temperature is fully made up by an increased make of gas. In the author's experience, however, the highest production has been attended by the largest yield of both tar and ammoniacal liquor. It is also believed that a high yield, and consequently high temperature, are most productive of illuminating value. But experiments at Windsor Street have shown that there is a falling off in illuminating value when very large quantities of gas are obtained. While the best general results are to be obtained from carbonizing at a fairly high temperature, it is essential that the gaseous products should be enabled to pass away freely, and without encountering in the ascension-pipe any absorbent of hydrocarbons such as thick tar. When obstruction occurs to

any extent in the shape of stopped pipes—and with high heats this is seldom wholly absent—the loss occasioned is likely to turn the scale in favour of a lower temperature.

Turning to the retorts, the author pointed out that much diversity of practice exists as to their form no less than their size. He favours the oval shape, as enabling the coal to lie within it in a fairly even layer, as allowing the coke to be more easily drawn than from the ordinary flat-bottomed ⏢, and as being very durable. Some retorts of this type have been under fire continuously at the Windsor Street works for 1567 days. Only a few years ago direct firing was universal; but the modification of the Siemens system of regenerative firing known as continuous recuperation is now being regarded with steadily, almost rapidly, increasing favour. Its chief advantages are a saving in fuel and in labour in attending to fires, and greater carbonizing capacity. These three advantages were considered by the author in detail; and figures were given in support of his conclusion.

Passing on to deal with the gas after its production in the retort, Mr. Hunt showed that the influence of condensation on the deposit of naphthalene is generally recognized. Hot or slow condensation, by keeping the gas in contact with the lighter constituents of the tar until a comparatively low temperature is reached, usually results within the works in the disappearance of this deposit. It may, however, be doubted whether this remedy is a wholly satisfactory one, seeing that it does not attack the evil at its root. The appearance of naphthalene may be regarded as an indication that all is not right with the carbonizing arrangements; and the question arises whether so high a heat as that at which it is produced is necessary, or even desirable, for the economical carbonization of coal.

With respect to washers and scrubbers, much controversy had, the author said, arisen as to the tower scrubber. He was of opinion that in bulk, cost, and manageability it left much to be desired. A great improvement had been effected by the introduction of rotary washers; but with these much more driving power is required than sufficed for working the water-distributor of the tower scrubber, and the wear and tear is greater. Mr. Hunt gave a description of Dr. Lunge's "plate tower," in which a series of perforated plates made of porcelain or earthenware superposed within a cylinder compel the breaking up of both gas and liquid at every interval between the plates. In a washer devised by the author, of which a description was given, the amount of back-pressure represented the mechanical power it required.

In regard to purification, Mr. Hunt said the terms granted by Parliament last session to the Crystal Palace District Gas Company, under which the maximum amount of sulphur other than sulphuretted hydrogen allowed in the gas is fixed at 20 grains per 100 cubic feet throughout the year, marked a departure from the stringency hitherto prevailing in connection with this subject that might with advantage to the consumer be made more general. He gave the results of a trial, extending over three winter months, of the lime and air processes at the Windsor Street works, in which the sulphur compounds were reduced from something like 40 to 45 grains per 100 cubic feet to an average of 14·1 grains per 100 cubic feet. The lime used was about 2·45 tons per million cubic feet of gas; and the quantity of air admitted at the condensers was from 1 to 1½ per cent., though very much larger quantities were occasionally sent in without increasing the quantity of sulphur compounds. Subsequently, on the adoption of this process for the whole of the make (the coal having been changed in the interval), the sulphur compounds occasionally rose to upwards of 40 grains, while the lime used was 3·77 tons per million cubic feet. This unsatisfactory state of things lasted until it was found to be largely due to the admission of air. Since then air had been rigidly excluded. Daily tests were made of the quantity of oxygen in the gas; and it was almost invariably found that when this went up the sulphur compounds followed. From this experience, it might, he said, be concluded: (1) That oxygen, so far from assisting in the removal of sulphur compounds, is actually prejudicial—at all events, when present in any appreciable quantity; (2) that it is of use mainly for the oxidation of the sulphuretted hydrogen, by which economy of lime is effected, and the spent lime, being chiefly in the form of carbonate, with a large percentage of free sulphur, is rendered practically inodorous; (3) that the quantity of oxygen, either pure or as atmospheric air, which may be safely employed, having regard to the reduction of sulphur compounds, varies with the carbon dioxide present—*i.e.*, the less carbonic acid, the more oxygen. It further appeared that, unless air could be almost completely excluded, the lime and air process was less suitable for the removal of sulphur compounds than one in which each impurity was separately attacked.

The author next dealt with the subject of the enrichment of gas by oil. He said that the form in which enrichment might have "come to stay" had, to a great extent, yet to be determined. Carburetted water gas, made according to the American methods, possessed great advantages in the saving of space and labour, and in facility of operation, besides affording an outlet for coke during the period of its greatest production; but its economy as an enricher had not been clearly established. The large percentage of carbonic oxide contained in carburetted water gas was a serious drawback to its use in any considerable quantity. It was possible, however, the method proposed by Professor Lewes, in which hydrogen is, to a great extent, substituted for carbonic oxide, would do away with the latter objection. The author next passed on to refer to the Maxim-Clark system of carburetting by the vaporization and subsequent admixture of light paraffin oils with the gas, and to the Young and Bell process of gasifying oil. He described this system, which might, he said, be called one of fractional gasification. In the Tatham oxy-oil gas process, oil gas, made at comparatively low temperatures, was mixed with oxygen while warm, by which means it was, he said, probable that illuminating hydrocarbons, which would be thrown down when the rich oil gas was cooled alone, were retained by the diluting gas. There could, he thought, be little doubt of the beneficial effects of using a mixture of oxygen when any gas of very high illuminating power was to be burned, for the reason that no burners could economically consume it. The advantage, however, of such a mixture when coal gas was carburetted with oil gas up to 16 or 17 candle power, and consumed by the aid of suitable burners, was problematical. A better and more economical result would probably be obtained by supplying the coal gas with the oil gas pure and simple. The author next passed on to deal with tar as an enriching material. He said that probably nothing had received more attention than tar for the enrichment of gas; but with little or no success. This was not surprising, when the matter was carefully considered. To distil the tar, and enrich the gas with the vapours of the lighter portions of the distillate, benzene, &c., would appear to be a sure method of procedure. But his recent experience led him to come to the conclusion that coal gas, under the usual conditions of distribution, was not calculated to sustain a greater quantity of benzene than it does at present. Moreover, the price of benzene, and the fact that all the tar it contained was insufficient to enrich the gas made to a greater extent than a few hundredths of a candle, would, he thought, militate against the general adoption of any such process. Neither could any method of utilizing tar by the action of heat upon it, or upon any of the less valuable constituents, be regarded as very hopeful. He believed there was more promise of success in the complete conversion of tar into gas and coke at gas-works.

The concluding portion of the paper was devoted to the subject of gasholders. The author remarked that in no direction had gas engineering shown such advancement since 1875 as in the construction of these vessels. The largest holder of the present day had from four to five times the capacity of its representative in the former period; while the cost had been greatly reduced. Trussed or girdered roofs had been abandoned; and guide-framing reduced in height, and even dispensed with altogether. There were numerous examples to show that gasholders, as ordinarily constructed, possess stability which only requires to be somewhat augmented to render them almost wholly independent of external support; and, after taking into account the additional cost incurred by this augmentation, there might still be a more or less substantial saving as against the provision of guide-framing.

The paper will be further discussed at the meeting of the Institution this evening.

## NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

### The Annual Meeting in Boston.

(*Continued from p.* 571.)

Mr. W. R. Addicks opened a discussion on the "Effect of Electric Railway Return-Currents upon Gas-Pipes," by saying that, as far as the city of Boston was concerned, he had not experienced any bad effects from this cause. With regard to some pieces of pipe which he exhibited last year, he now had reason to think that the corrosion was due to causes other than electricity—such as the presence of salt water in the soil, which he had found to be extremely detrimental to the service-pipes. For some years he had made a practice of relaying every service with which trouble had been experienced during the winter, on account of stoppage of water; and it was a remarkable fact that all these services were found more or less leaky. This seemed to point to the necessity for further inquiry into the causes of corrosion of pipes; and it would be well if concerted action could be taken by the various Gas Associations. It was a very important question, and should be fully and accurately investigated. Mr. W. A. Learned said at Cambridge the question had been gone into; and the electric companies adopted overhead return wires, and also double bonded the rails at the joints. These precautions had been attended with a marked improvement, in respect to both gas and water pipes. Welded joints had been tried, but without success; and also a plan for connecting the pipes with earth-plates. The latter were rapidly corroded; so that the plan was not effectual. In his opinion, electrical railways should be under such restrictions as would compel the use of return-wires of sufficient area. Mr. Neal produced some pipes that proved beyond doubt the effect of the escaping electricity on gas-pipes. Mr. Pritchard remarked that the trouble was not wide spread, and did not affect the majority of the members. Mr. Jenks stated that he had investigated the question with the aid of voltmeters. In one place, he connected a lead water-pipe and iron gas service-pipe; and he found that, when a car approached within 100 yards or

less of the locality, the voltmeter would show a current of 10 to 40 volts passing, which was sufficient to make an incandescent lamp glow feebly. Trials at a mile and a quarter of a mile respectively away from this spot were attended with no result. On substituting a good earth connection for the lead water-pipe in the first instance, the same results followed. He had, however, experienced no leakage or other trouble. Mr. Allyn produced a piece of 1¼-inch galvanized service-pipe that had been eaten away to a mere shell, and also coated with lead. It came from damp ground, impregnated more or less with salt, in the vicinity of an electric power station. An electrician had explained to him that this action was analogous to that of an ordinary battery; a lead pipe somewhere in the neighbourhood supplying the lead. In another case, a service-pipe had been completely destroyed by electrolysis. Mr. J. H. Farnham, the Electrician to the New England Telephone Company, addressed the meeting at the invitation of the President. He gave a detailed account of the experiments he had undertaken in connection with his own cables, which led to the conclusion that electrolysis was capable of causing serious trouble. When a current passes from a metal to water or to moist earth, electrolysis takes place, if the voltage is sufficient—3 or 4 volts being enough. A series of electrical measurements was made all over the city of Boston, with the result that, within a certain radius of the two electric tramway power stations, all the cables and pipes were negative to the ground; but outside this radius, they were positive. At that time the negative pole of the dynamo was connected to the overhead wire, and the positive to the ground; but the railway could be run equally well with the current in either direction. In this case, the current was divided amongst all the conductors that came in its way; and a part of the current left the rails, went through any pipes, cables, or other metallic conductors that might lie in its path, and returned to the rails at a point near to the spot where the power was required for the cars. It simply made the cables or pipes a part of the service; and this explained how these were negative in one part of the city, and positive in another. Wherever the current was able to pass from the pipes to the ground, trouble was likely to arise. These measurements were carefully mapped out, and satisfied all concerned that the source of the trouble was the railway power station. In searching for a remedy, earth-plates at the bottom of the manholes were tried; but they were of scarcely any advantage. Reversal of the current was tried, using the overhead wire for the positive current; but this simply reversed the conditions of the cables, &c., and changed the scene of the troubles without altering them. Perhaps these alterations had somewhat misled Mr. Addicks; and the first conclusions arrived at by that gentleman were correct. After trying various expedients, the plan which proved a successful remedy was the laying of a heavy copper cable, 1 inch in diameter, connecting it by copper wire to all the telephone cables in the dangerous district, and joining it to the ground side of the dynamo. This cable conveyed back the current which formerly escaped and passed through the earth. Any pipe found by the voltmeter to be positive to the ground was in danger; if negative, it was safe. So the remedy was simply to provide such conditions as would prevent the pipe from being positive to the ground. He had taken some pains to find out how far gas and water pipes had been effected by this cause, although his primary object was the protection of telephone and telegraph cables; and he had sufficient evidence to show that the matter was one of pressing importance, for it was possible that a large amount of damage might be done before it was found out. After further discussion, it was agreed that the Committee should continue their investigations, and seek the co-operation of other Associations.

Mr. W. E. M'Kay, of Boston, read a paper on the "Storeage and Measurement of Enriching Oils." He strongly condemned the practice of carrying or storing petroleum in wooden receptacles. In some places, the law required that the oil-tank should be set in a concrete or brick pit or basin, having a capacity equal to that of the whole contents of the tank; and other regulations were in force. He much preferred to have the tank easily accessible, rather than to bury it in the ground or under water. In the case of a tank sunk in the ground, and below water-line, the lifting force the water would exert on the tank when empty, or nearly so, must not be overlooked. The larger the diameter of the tank, the greater would be the lifting or floating power. Small tanks might be set on piers; but he preferred to build large tanks on a carefully levelled ground surface, using a layer of gravel on bad ground. In one instance a 9-inch layer of gravel, well rolled, furnished a stable platform for a tank 54 feet in diameter by 32 feet high. It settled but slightly, and nearly even, when containing 2000 tons of water and oil. He advocated great care in the erection of a tank, to see that the material and workmanship throughout were perfectly sound and good. The whole should be tight when tested with water. The bottom should be laid out perfectly level, and the sides exactly plumb; care being taken that the angle-iron joining the bottom and sides should be accurately made, and well supported. It was difficult to make a large tank with an absolutely flat bottom; but it should be evenly seated all over, any spaces beneath being filled up with cement grouting. The rivets used should be swollen at the neck; and while a plug-head was the best, a cup head was cheaper and nearly as good. None but the best material would stand cold riveting; and so he recommended hot riveting in preference. Flat roofs carrying a layer of water, were sometimes used. These gave a vapour-proof top; but such roofs must be free from the strain due to changes of temperature, or to any want of rigidity in the sides. The early patterns used in connection with the United Pipe Lines had conical roofs, rising 6 feet at the centre, covered with light iron, painted on both sides, and riveted to the top angle iron; and the roof was supported by wooden rafters, carried on posts placed next to the shell of the tank on the inside. He preferred a stronger roof, well secured to the top angle iron, with hollow iron columns for supports. It was most important that the whole—including the roof—should be perfectly tight. No cast iron should be used; and the discharge pipe, passing through the bottom ring of the side plates, should terminate in a hinged swing pipe, enabling oil or water to be drawn off at any level; the swing pipe to be raised or lowered by means of a chain or rope passing through the roof, and attached to a small windlass. A check-valve on the pipe is a useful precaution; and also a pressure-gauge. Some danger was incurred in tanks having a vent open to the air, by the formation of an explosive compound in the space above the liquid, which might be fired by accident or lightning. In gas-works and with absolutely tight tanks, this could be prevented, by venting the tank into a gas-main; so that the space was full of gas, and thus no explosive mixture could be formed. An oil-strainer should be fixed on the discharge-pipe, fitted with a valve for drawing off water. The outside of the tank should be well painted; and the surface should be dry when the paint is laid on. A steel tape should be used for gauging the tank; and the diameter should be carefully taken at the centre of each ring of sheets. Floats, plummets, or gauge-sticks could be used for taking the level or depth of fluid in the tank; or a series of gauge glasses could be provided. For measuring the oil as supplied to the generators or retorts, the author preferred a straight-way disc-valve, with a graduated arc scale. The concluding portion of the paper was devoted to a consideration of the inaccurate results afforded by ordinary hydrometers.

On discussion being invited, Mr. Shelton said that the author, in treating of foundations, appeared to think a bed of gravel sufficient. It was a common practice to provide a concrete foundation; and was this an unnecessary expense? He would also like to hear why cast-iron manholes were not sufficient for all practical purposes. He was not convinced that a wrought-iron manhole was superior to one made of cast iron. Mr. Allyn thought that, if a bed of gravel was to be provided, it would be better to incur the additional expense of converting that gravel into concrete. In practice, there might be danger in caulking both inside and outside, that the second caulking would be very likely to start the first; and he questioned whether one caulking would not be quite as sound. Mr. Addicks said that, in yielding ground a gravel foundation was preferable to a concrete one, as being likely to yield more uniformly. He was not in favour of concrete foundations under oil-tanks. Mr. Wood said that, under three of his storeage tanks, he had 2 feet thickness of Portland cement concrete, and a 2 feet retaining wall. The nature of the foundation was entirely a matter to be governed by local circumstances. Where the load was properly distributed, and settlement was expected, there was much to be said in favour of a yielding foundation. In laying a bottom on concrete, it should be bedded solid; not merely rest on the rivets. So it must be put down before the top layer hardened. He would add that the strong concrete foundation was necessary in his case, because the locality was exposed to the tides; and they were possibly below water-level at every high tide. Mr. Rowland said that good work could be done with either cast or wrought iron manholes. If the first caulking was properly done, the second would not start it.

Mr. M'Kay, in replying, said that concrete foundations were not always necessary. The tendency was now to abandon cast iron in favour of wrought iron or steel, not only on the score of price, but because it was stronger, and not liable to rupture by sudden strain. He believed that excellent steel could be had at a price much below that of good cast iron. A better fit could be made with a wrought-iron or steel ring than with a cast one; and the latter might be cracked by an accidental blow. With regard to hydrometers, the best way was to keep a particular instrument for similar oils. Sufficient precautions were not taken in graduating the instruments; and therefore they varied in their indications one against another.

*(To be continued.)*

**South-West of England District Association of Gas Managers.**—The spring meeting of this Association will be held at Salisbury on the 17th inst., under the presidency of Mr. Norton H. Humphrys, F.I.C., F.C.S. We learn, from the circular issued by the Honorary Secretary (Mr. H. Sainsbury, of Trowbridge), that the members will assemble about noon at the gas-works, where they are invited by the President to lunch. After this an inspection of the works will be made; and then the general business will be proceeded with. This will include the admission of a new member (Mr. S. J. Ingram, of St. Austell); the delivery of his Inaugural Address by the President; a paper by Mr. A. Thomas, of West Cowes, on "Retorts and Chimneys;" another on "The Prepayment System," by Mr. G. J. Gough, of Calne; and a description of the governor-house at the Stapleton Gas-Works, Bristol, by Mr. D. Irving.

## THE CONSTRUCTION OF GASHOLDERS.

In last Tuesday's issue, we published the principal portions of the paper on the above subject, read the previous evening, at the meeting of the Society of Engineers, by Mr. E. Lloyd Pease; and we now give a report of the discussion thereon.

The President (Mr. G. A. Goodwin) said it was his pleasurable duty to ask the members to accord a hearty vote of thanks to Mr. Pease for his paper. He was particularly struck by the figures which the author brought out, as to the value of the supporting material compared with the structure itself. He (the speaker) did not know of any other structure where there was such a great disproportion of useful material to the simply supporting or unuseful material. Therefore it seemed to him there was considerable room for improvement in the guiding of gasholders. If the author's arguments were soundly based, the arrangement he had brought before them should grow in use very rapidly.

Mr. C. Gandon, Engineer of the Crystal Palace District Gas Company, remarked that he could not contribute anything very practical to the discussion, because he had had no experience with these new ideas of supporting gasholders without guide-framing. It appeared to him that there had been, in times gone by, an exaggerated idea as to the strain which the supporting framing of a holder had to resist; and there was no doubt that engineers constructing holders had gone to extremes in this respect. They had had of late years several illustrations proving this. He believed Mr. George Livesey was the first to somewhat alter one's ideas on that point, by the holder erected at the Old Kent Road gas-works, around which there was an exceedingly light framing. He could not say this was before the idea of gasholders being erected without guide-framing came into vogue, but he believed it led up to that idea, and to its being carried out. In theory, it seemed to be perfectly right; but personally he was not yet quite sufficiently convinced of it to adopt it in practice. If they took a three-lift holder, there was no doubt that the weight of the two outer lifts was sufficient to keep the upper lift in equilibrium, and to prevent the tendency to tilting. Mr. Cripps, in the very valuable work on "The Guide-Framing of Gasholders" which he brought out a few years ago, proved this, he thought, so as not to admit of any doubt about it—that, in fact, the weight of the two outer lifts was considerably in excess of any strain that could be put on the top lift by the force of wind or snow, or both combined. This was a very simple thing to reason out; and they had had several illustrations of it. He believed the first one he saw was at the Rotherhithe Gas-Works, where an additional lift was added to a gasholder, and was allowed to rise without any support whatever. It had been at work now for many years, and without any mishap, which proved the theory to be correct. Another apt illustration was the largest holder in the world, which had been at work at East Greenwich during the past two years. It had six lifts; and the two upper ones rose without support, and worked very satisfactorily. Passing from three-lift to two-lift holders, Mr. Cripps also showed that the weight of the lower lift was quite sufficient to balance the upper one, but not with so large a margin of safety. But he (Mr. Gandon) did not think he should take up the inner lift without framing. It was true, as the author had pointed out, that the framing of a holder was a very expensive item; but it occurred to him that, if they were to dispense with it, they must strengthen the holder itself in some way to form sufficient rigidity, as, in his opinion, there was certainly a tendency to buckling when exposed to strain in that way. The paper now before them advocated a further step in advance—to abolish the guide-framing entirely. He was not at present prepared to submit any arguments against this, except that the guide framing was undoubtedly an additional safeguard to any holder, because taking a single-lift holder, if there was no guide-framing, the bottom curb, or the bottom of the holder must certainly be held tighter. The whole strain was thrown on the bottom part of the vessel (which was to his mind the weakest); whereas, if they had guide columns, a portion of it was received by them. If they adopted this ingenious device of wire ropes or Mr. Gadd's spiral guides, the whole strain was still thrown upon the bottom of the holder; and so there must be additional strength in the holder itself to resist that. The figures given in the paper as to the weight of the framing were rather striking. In the first case, the weight was given as 712 tons; while in the third it was only 128 tons. He thought Mr. Pease would admit that this was not perhaps quite a fair comparison; because he took it that the 712 tons was the weight of cast-iron columns and probably of cast-iron girders; whereas in the third case, they were made of wrought iron. A greater strength could be obtained from standards constructed of wrought iron in comparison with their weight than from what were generally known as circular columns. In his experience, one great objection to wrought-iron standards and lattice-work framing was in their having so many joints that were liable to be attacked by rust and decay; while the cast-iron columns would practically last for ever. He was not advocating cast-iron columns in all cases, especially in holders 120 or 150 feet high. Then the author had referred to tangential rollers, and had remarked that they were practically introduced in the holders erected by the South Metropolitan Company. He (Mr. Gandon), however, saw them employed on the Continent many years before he did in England; and they had always struck him as being, in certain cases, very useful things. Whether they were necessary was another matter; but if there was any pressure exerted by the wind, they distributed it over the framing more equally than radial rollers. He understood that the author did not condemn them, but that he argued they were unnecessary for the upper lift. If, however, they admitted that the upper lift could be sent up without any guide-framing whatever, then tangential rollers (which were more expensive than radial ones) were unnecessary. With regard to the innovations for guiding without framing, he had not sufficient faith in them at present; and he should not be disposed to adopt them, except so far as the inner lift of a three-lift holder was concerned. There were, he knew, several examples of holders erected without any framing, and up to now they had been successful, and no accident had happened to them; and he did not know there was any to be feared, if properly constructed. With regard to framing, he remembered some years ago, seeing in London an old gasholder which had a framing of circular columns; and for some reason or other—probably more from defective construction than insufficiency of material, it had proved to be so weak that they had to strengthen it by putting a horizontal ring of girders round it. Therefore this showed that (though framing might be unnecessary where due regard was had to the proper construction) they might erect a holder where the framing would be found insufficient to support it. It was a two-lift holder; and he believed it was still in existence.

Mr. J. W. Wilson, jun., asked Mr. Gandon whether it was not a fact that the cost of repainting the elaborate wrought-iron structures round gasholders was not very much greater in proportion than in the case of the old cast-iron columns, which they were perhaps prone to decry too much.

Mr. Gandon replied that that was undoubtedly the case. The cost of stopping the rust between the numerous joints was very large.

Mr. H. O'Connor, of Beckton, said he had perhaps taken particular interest in the subject of the paper, inasmuch as, when he was in India some four or five years ago, the same idea occurred to him as had occurred to Mr. Pease; and, as a matter of fact, he took out provisional protection some few months after Mr. Pease had done so. There was no question that a gasholder could be guided from the base, by ropes or other means; but as Mr. Gandon had put it, was it worth while to make a holder that had to move up and down heavier to withstand the strains of wind and snow, rather than use guide-framing to support it, which had not to be moved up and down? Mr. Pease pointed out, and showed to a certain extent by his model (the upper lifts of which were of silk), that there was very little strain on the side streets due to wind pressure when the pressure of gas was in the holder. Why should they not, if such were the case, have the sides of the holder made only just sufficiently strong that they would support their own weight when at rest in the tank, and so do without the channel-irons which were generally used to keep the holder in an upright position? In some holders, however, as Mr. Gandon had pointed out, without some form of vertical stiffeners, the framing was not sufficiently strong to withstand the side pressure. Then, with regard to the question of tangential rollers, these had only been, comparatively speaking, recently brought into use. This was because the guide-framing, as formerly designed with cast-iron columns, without much lateral stay in the form of horizontal girders or diagonal tie-rods, had very little lateral strength, and therefore any additional pressure on it pushing sideways would hardly have been advisable; whereas, with the modern system of horizontal girders, ties, diagonal bracing, and so on, they were brought into play, and the pressure was distributed from one column to another, and finally to the ground. Mr. Pease, he observed, took 40 lbs. on half the total sectional area as the maximum pressure of wind against the holder; but there seemed to be a divergence of opinion upon this point. Mr. Pease's figure agreed with that given by Mr. Newbigging and Mr. Trautwine; but Mr. Cripps only took 32 lbs. Taking the 50 lbs. wind mentioned by Mr. Cripps as the maximum, this meant about one-third of the diametrical section. He had some figures from other authorities on this question of wind pressure. Professor Adams took 0·7854, Hutton 0·67, Molesworth 0·75, and Rankine 0·5 of the area of the diametrical section as the equivalent plane surface equal to the cylindrical area exposed to the wind. Another point he did not quite understand was the reason the author had added the 90 tons to the 80 tons, where he said: "The lowest portion of the light sheeting of the second lift consisting of $\frac{3}{16}$-inch sheets, may be considered to be the first point at which buckling or crumpling would make its appearance. This, however, cannot take place until the vertical tension of 90 tons, and the latent strength of the sides of 80 tons has been overcome—equal to 170 tons." Surely this latent strength was strength which would resist a compressional strain, and had nothing to do with the question in point where the tensile strains were being considered. With regard to the use of channel-iron stiffeners, these were necessary for other purposes besides merely for stiffening the sides of each lift when at rest in the tank. They prevented, when placed on both sides of the sheets, the bulging of them. Otherwise they would rub against the grip of the next outer lift; and even with very

strong channel-iron stiffeners, he had known them bulge out so much that they would rub against the rivets on the ordinary half-round iron that was placed on the grip of the next outer lift. There was another little point as to the arrangement of the ropes in Mr. Pease's invention. The ropes were placed in a vertical position; while the strain, it seemed to him, was not in a vertical direction. But if the ropes were placed at an angle, as much as could be allowed in the space available round the edge of the tank, the pull would be more in the direction of the strain. If the holder started to tilt, the axis would be practically in the centre of the holder, and on a level with the water. Therefore the movement at the curb where the rope was fixed would be a circular one, the centre of which circle would be the axis already mentioned, and the radius the distance from the axis to the curb; and the best direction for the ropes to be trained for the resistance of the tilting effect would be at a tangent to this curve at the curb. Some time back he had a conversation with the author of the paper on this question of training the ropes in the manner he had just mentioned. It was not convenient then for him (Mr. O'Connor) to state the method he should propose of placing the ropes in the most suitable manner to resist the strains set up when the holder might be caused to tilt; but that it could be done was quite certain. It seemed to him that it would be an advantage to place the wire ropes so as to obtain the greatest amount of strength from them. With regard to the framing of a gasholder as now made of steel and wrought iron (which were admirably suited to resist tensile strains), it appeared to him the best thing they could do was to construct the framing so that it should contain as few compressional members as possible. He had lately been looking into the question very deeply; and he had arranged a framing in which the only compressional members would lie in the standards themselves. In Cutler's diagonal system of framing, for instance, the framing was sometimes under compression, and sometimes under tension, according to the direction of the wind, which would cause in course of time a looseness at the joints. In the framing he had devised, the only compressional members would be in the columns, and in these only for a very short distance.

Mr. R. J. G. READ referred at some length to the great transition which has taken place in gasholder construction; and he adverted to the gasholders which were first constructed under Mr. Wyatt's supervision at Beckton, with columns made of heavy castings, bolted together with horizontal joints. He thought the author had gone into his subject very thoroughly, and shown clearly the advantages to be derived by resorting to the simple means of supporting the holder by wire ropes. There were, however, several discussable points connected with the strength of the holders to stand by themselves without outside stanchions. He thought it would be a disadvantage to do away with the stiffeners in the sides of the sheeting, because unless there was some stiffening to resist the compression, they would have the sheets buckling up. It struck him the great power of the model holders before them to resist distortion was in a large measure due to the immense surface of plate that offered resistance to tension. As to the difference in the advantage of the old iron columns over the new lattice ones with regard to wear and rust, he said certainly the cast-iron columns, in the position in which they were usually placed in gas-works, would be far better able to withstand the action of the gases than the wrought-iron ones. But he had recently found, in looking into the question of the preservation of iron, that the outcry against rust and painting was due to a great extent to the rubbishy paint used. A good oxide paint should contain upwards of 70 per cent. of pure ferric oxide; while a sample he had tested only contained 9 per cent.

Mr. W. H. Y. WEBBER, having been invited by the President to speak, said he had followed the reading of the paper with a great deal of interest; and personally he was very much obliged to Mr. Pease for the way in which he had explained a good many things about his system which he did not quite understand before. The author started with a bit of ancient history as connected with gasholder construction; and it was perhaps as well to point out how gasholder construction grew. As a holder was required, of a certain size, it was stuck up; and the next one was built a little bigger, and the framework was made a little heavier, and so on. The early gas engineers were, as a rule, so fully engaged in working out other matters that they did not pay much attention to the economics of gasholder construction; and for many years there was no sort of systematic inquiry whatever into the principles by which these progressively growing structures were maintained. The consequence was nobody thought it worth while to investigate the matter theoretically. When a man wanted to put up a holder, he simply looked at the nearest one to it and copied it, giving it a little more strength where he thought it needed it, until the time came when, in Mr. George Livesey's opinion, that process could not be carried any farther. Cast-iron columns (which had been frequently referred to during the discussion as being the original style of supporting gasholders) were made bigger and heavier; and so heavy and strong, according to the way in which cast iron was reckoned, that he (Mr. Webber) had heard Mr. Corbet Woodall say that he once saw a cast-iron column drop in halves when being lifted, and that remark went to demolish what one or two speakers had said about the strength of cast iron—it might be strong if it had not a crack or a flaw in it. The great movement of which the models before them and the paper was one of the manifestations, really took its origin from the time when Mr. Livesey first began to ask himself and other people: "What is the office that the framing of a gasholder fulfils; and how much of that office do particular parts of it fulfil? If we knock off this, or slacken that, what happens?" It might seem curious that nobody ever asked those questions before; but the fact remained that they were not asked; and it was by that simple common-sense method of inquiry and experimenting that Mr. Livesey arrived at the daring results with which they were now familiar. Up to that time the necessity of columns had been taken for granted; but as soon as people began to ask questions, gasholder constructors commenced to make various changes, until they had got to this method of supporting holders by wire ropes. He looked upon this as really only the beginning of a new order of things. Mr. Gandon had said he was almost persuaded by the wire ropes, but not quite; and he preferred someone else to be the first to use them. But everybody felt very much like that; and this thing would have to go forward by tentative steps. There was no amount of mere saving of cost that could compensate any gas engineer for incurring the slightest risk whatever of instability in his gasholders. The stability must take no account whatever of expense; the possibility of saving was an after consideration altogether. Sometimes it had been urged by people who did not care for these wire rope, spiral, and other experimental methods, that they liked to sleep easily in their beds at night. They did not like any of these new-fangled notions; but they confessed to an assumption that was not always justified. The standing framing was not always strong; it might be heavy, and it might be costly. A holder with 712 tons of material outside would not insure its being one atom stronger than one with only 128 tons; and no multiple-lift holder could ever be regarded as a thing that did not require constant care and looking after, and which did not cause a certain amount of anxiety to those who were responsible for it. But since many things might happen to a multiple-lift holder, the suggestion to do away with the vertical framing was simply one step in advance; and it was a question whether this did not make it less a trouble than many a gasholder which was surrounded by a framework, which might be more a pretence than a reality. Mr. Pease he regarded as one of the most philosophical of workers on these lines. He had experimented in this; and he had gone into the thing with a clear idea of finding out what these ropes would do; but this was just the point he did not see in the paper before them. He (Mr. Webber) had followed it very carefully; and he should like to ask Mr. Pease whether he had ever put a dynamometer spring on to one of his training ropes, so as to find out what they really did. He was shrewdly of opinion that all the talk about the windward and leeward strains was much like talking in the air. He was not at all sure a gasholder really put any more strain on its framework in a gale of wind than it did in a calm. He well remembered the loosely framed holders of the days when he first made his acquaintance with these vessels. They were made loose, so that there should be no difficulty in their going up and down; and they could depress a holder some 4 or 5 inches to one side or the other by simply walking on the top of it. A loose holder like that, especially if it was not well confined at the bottom, would wabble about in a most alarming manner, and put an immense amount of strain upon its support, as was pointed out to him many years ago by a shrewd foreman gasholder builder, when they were fixing some of the most gorgeous top carriages and rollers he (Mr. Webber) ever saw. Well, they were having these things adjusted and packed up with the greatest accuracy, when the foreman said to him: "I don't value these things a bit. Let me get the bottom rollers right, and the top ones will take care of themselves;" and he further said: "If these things are so necessary, how is it that, when we start blowing up the holder, we have to leave them slack?" As long as a gasholder was fairly held at both top and bottom, either by rollers, ropes, or anything else, his (Mr. Webber's) opinion was that the influence of a gale of wind upon it was really *nil*—that the weight of the holder itself was quite sufficient to neutralize it. Mr. Pease had fallen into the habit of talking about a square foot gale. In his explanation of one of the diagrams, he said: "Applying this to an actual gasholder, it would be *found*" (he wanted to know whether it ever had been found) "that the 180 ft. by 90 ft. holder that has been taken as an example requires, under the pressure of a 40-lb. per square foot gale, support to the amount of 36 tons." He (the speaker) thought the statement should read *calculated*, which was a different thing. Mr. Gandon and also Mr. O'Connor made another assumption in their remarks as to the extra weight which would be necessary in the side sheeting of gasholders made in any other way than the ordinary; but he did not think this at all followed. Gasholders must be made of sheeting stout enough to stand the necessary scraping and knocking about; and when they had provided for that, they really did not want to reckon for anything else. If the holder was strong enough to stand atmospheric influences and accidents, it would stand almost anything, no matter what sort of framing they liked to put to it. With regard to tangential rollers, he believed it was Mr. O'Connor who said that they only came in after columns were supplanted by standards with diagonal framing. The tangential roller was a French idea, and was put up with the old style of columnar

guides; the idea being that thereby pressure was distributed on two points instead of one. The radial roller leant up against one column; whereas the tangential leant up against two. He believed an example of this was given in "King's Treatise on Coal Gas," in the case of a gasholder designed by MM. Monnier and Thibaudet for the Marseilles Gas Company. An eminent engineer, speaking of our ordinary assumption of the "factor of safety," called it the factor of ignorance. He (Mr. Webber) thought this remark particularly applied to the whole subject of the strength they had come to put into the various means by which gasholders were maintained stable. They were working in the dark; they were doing this sort of thing tentatively; and only after very much more expensive experiment had been carried out by those who were capable of not only instituting proper experiments but drawing proper conclusions from them, could they know what framing was really best, and by what means it could be safely cheapened. The cost of the ordinary fixed outside framing of the old pattern might, he thought, be materially reduced by systematic selection of ordinary commercial patterns, and doing away with fancy work, because the expense of the fixed framing was not merely a matter of weight but also of design. He thought that if those who still adhered to gasholder framing only picked out commercial sections, and put the thing together with as little riveting as possible, that, as Mr. Pease said, the expense of this form of construction could be materially reduced. He, however, hoped not only for an ultimate reduction of the expense of the guide-framing, but for the doing away with all those unsightly and unnecessary structures, and proportioning the framing, whatever it might be—whether tensional or screw framing—to the work that it had to do. He looked for this in the continuance, by gentlemen who (like Mr. Pease) were interested in the subject, of experiments such as they had seen examples of that night.

Mr. J. L. Chapman, the Engineer of the Harrow Gas Company, was also invited to speak. He said he was very much with Mr. Webber on this subject. The relative expense of uncolumned and columned gasholders was a point which would require careful consideration. There was no doubt in his mind that the present size of the columns of gasholders was far exceeding what was needful; but, as had been stated, gas engineers did not like doing away with the stability of anything until they were quite satisfied with the new substitutes brought before them, however cheap they might be. He was not at all clear as to this wire-rope system guiding the holders perfectly and surely, as had been stated by Mr. Pease. But, of course, past experience made one become somewhat prejudiced; and it was very difficult to plunge into new theories.

Mr. Percy Griffith said the author, in referring to the interesting types of gasholder framing, had dealt somewhat cursorily with them. He had condemned very generally, owing to excess of weight, and consequently (he took for granted) the excess of cost, the old-fashioned standard guide-framing. Mr. Pease had given them three instances, comparing variations in weight of columns and girders, which, to say the least of them, were very remarkable. He should like to know something more about these, because there might be some explanation which did not appear on the surface for much of the difference between them. Having briefly referred to the devolopment of gasholder framing, the speaker said it appeared to him that, in the book referred to by Mr. Gandon, Mr. Cripps had swept away a good deal of the misconception which existed as to strains on gasholders; and if the conclusions to which he came could be taken as anything like correct, a new condition of affairs was apparent. The strain on the holder was found to be best resisted not by a single cantilever, which had its whole strength relying upon its own individual base, but by the coustruction of a cylinder round the holder forming a complete framing in itself, and having strains in it which were very different indeed from those of the cantilever. It was in following out this theory that he (Mr. Griffith) designed a holder which was constructed, he thought, as cheaply as it was possible for a holder to be. Calculating on the basis of Mr. Cripps's formulæ and from his reasoning, the standards, instead of being cantilevers, became simple compression members; the diagonal tie-rods taking the tensional strain. There was no tilting force exerted upon the standards; therefore the standards did not need to be wide. Their strength was simply in concentrated cross section, and not distributed in the form which the cantilever latticed standards took. The question of painting and getting at the latticed standards was overcome by these means, because, in the case referred to, the standards were nothing more than rolled iron joists of a standard section, and could be bought at from £5 to £6 per ton. The tie-rods also were nothing more than round rods, and were joined to the flanges of the rolled iron joists. The construction was so simple in the form and design and jointing, and there were also so many advantages with regard to the maintenance, painting, and so on, resulting from the simplicity of the structure, that he thought this type of holder would present very serious rivalry to holders without guide-framing. The only objection which arose in his mind to going into anything so entirely new as Mr. Pease's system was the absence of exact knowledge on two or three points. The calculations which had been given to them with regard to the strength appeared to be somewhat elementary in character; and it struck him that the paper might have been more useful to engineers if it had contained a little more detailed calculation, which they could have studied at leisure. They had 40 lbs. per square foot given as the wind strain. His own experience was that the wind pressure must be taken as a good deal more than that—even as much as 56 lbs. Supposing they took as correct the calculation given, it proved this—that the holder was strong enough in itself to resist contortion; and this left the only remaining tendency of tilting. Now the strains on a holder became very complex indeed as soon as the holder got the slightest degree out of the horizontal; and the strains on the fixed internal members of the holder, on the curb and so on, became suddenly very great—a slight amount out of the horizontal would produce them—and he should have liked to have had a little more calculation in respect to this point. He also asked the longest time that a holder of any reasonable size had been erected, and whether any test had been made with one fully inflated during the recent gales. Then regarding the use of wire ropes, there were some rather sharp bends on gasholders; and he would like to know whether any perceptible wear upon the ropes had been found, and whether any weak points had been discovered where they worked over the pulleys. Also whether a holder had been tested to the point of collapsing, so as to illustrate where the collapsing actually occurred, and to test the actual strain upon the ropes. These were investigations which he thought any engineer designing such a holder would want to know something more about. What happened, too, when the holder blew, or did the ropes prevent it doing this, because if they did, it would be a great objection, as it would throw considerable back-pressure on the retorts, or the exhauster, or some other part of the plant. In one part of his paper, Mr. Pease gave as the resistance to buckling the sum of the tension resistance and compression added together. If the plates were only in tension, it was useless to consider their strength in compression; and if the side of the holder came into compression, why consider its strength in tension? They could not add the strength and resistance of compression to the strength and resistance in tension, because they were two very different things, and could not act at the same time.

Mr. C. J. Brown, the London representative of Messrs. Ashmore, Benson, Pease, and Co., referring to the point as to the durability of the wire ropes, said that the Engineer of a large gas-works, who also acts as Consulting Engineer to several collieries in South Wales, had told him that he had a number of wire ropes working under all conceivable circumstances, and one making 500 revolutions per minute; and he thought "a bedridden man's shoes would wear out as soon as this."

After a few additional remarks by the President,

Mr. Pease, in replying to the discussion, prefaced his remarks by admitting that his paper was of an elementary character. Answering first a question put by the President, he said that in the last but one holder erected by the South Metropolitan Gas Company, the bracing was increased during construction; but why, he did not know. There was now a double set of bracing; but as the holder relied almost wholly on the bracing, and very little on the standards, it was, he supposed, thought desirable to have a large margin of safety in the bracing. With regard to the thickness of the side sheeting, he really could not see there was any necessity to make the sides any stronger than they were now. He quite agreed there were many uses for channel-iron vertical stays, and that they had better not be dispensed with. Of course, many gasholders were built so close between the cup of one lift and the sides of the other—only 2 or 3 inches in some cases—that the slightest amount of irregular construction of the side sheets would bring the rivets on the side sheeting against the cup on the next lift. This, however, was more the fault of the design than of the construction. As to the pressure of the wind, he merely mentioned 40 lbs. as a figure easy to work with; and it was on the safe side. In gasholder construction, they did not sail very near the line; so that, taking 2 lbs. more or less, was not an important matter. He did not know that there had been any reliable information secured by anybody as to the pressure of the wind over such an extensive surface as a gasholder. Mr. Gandon made some remarks as to the figures given regarding the three holders alluded to in the early part of the paper. The first two, he might say, were reliable comparisons, as in both cases the columns were cast iron and the girders wrought iron; and they showed a sufficiently large increase to make the point. The third holder was one that was exported to Australia; and no doubt the weight was cut down on account of freight. With regard to the buckling of the sides of the silk model, to which reference had been made, that was an illustration largely of the use of channel-iron verticals. There were no vertical stiffeners in it. There was nothing but silk; and therefore it really could not carry its own weight. In proportion, the model was much weaker than a gasholder with vertical stays; but if it was strutted up with verticals, there would probably be no buckling, even with the weight which had been put upon it (6 lbs.). Mr. Webber had made some remarks as to the possibility of instituting some experiments as to the pressure a gasholder would withstand. No experiments had been made on a gasholder of any size—certainly not with an iron one—that he was aware of; but some time ago, he (Mr. Pease) carried out some experiments with a 5-foot holder, constructed of brown paper, in order to see the weight it would withstand simply inflated, and to get an idea as to how it would collapse under very great

pressure. It stood a large amount of pressure—he forgot how many 100 lbs.; but there was hardly an appreciable bend in it, though there were lines of distinct corrugations.

Mr. WEBBER remarked that his point was not the strength of the side sheeting; but the actual stability of the vessel. He had an opinion which he had held for years, that, if a vessel once began to get out of the perpendicular, no strength that could be put on the side framing, by ropes or anything else, would hold it up.

Mr. PEASE said he did not quite see it in that light himself; but still it might be so. He enlarged upon this point by referring to the diagrams; and then, alluding to the remark that was made as to the elementary character of the calculations, he said he was perfectly aware they were so. He did not presume to bring before the meeting a mass of calculations even if he had felt capable of doing so. The paper was suggestive of one or two points that had not been alluded to before. He might especially mention the fact of the strength the holder exhibited, even when not inflated and standing on the rest-stones. That strength, as he had tried to emphasize, was still in existence during inflation; and no buckling could take place in the holder till that strength was overcome. This was why he had, perhaps rather irregularly, added together the two figures making the 170 tons. [In order to more clearly explain his meaning, Mr. Pease again referred to the diagrams.] As to the length of time these holders had been in use, the first one was put up in 1889, and had been working regularly ever since. The ropes in the first holder erected at Manchester did not show the slightest signs of wearing; and they had been at work since 1890. The pulleys used were about 12-inch. Then with regard to the question as to whether a holder of this kind had withstood any great strain, he was informed, by letter from America, that a two-lift holder, constructed on this system, was fully inflated when a cyclone passed over the town; and it remained quite unharmed. In conclusion, he expressed his warm thanks for the kind way in which the paper had been received.

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**Dr. J. H. Kimbell, J.P.,** the Chairman of the Knowle Gaslight Company, died on Monday last week, at the age of 75. The deceased, it appears, contracted a severe cold, and pneumonia supervened.

**German Association of Gas and Water Engineers.**—The thirty-fourth annual meeting of this Association will take place at Carlsruhe on the 19th of June and three following days. On the evening of the 18th, there will be a reception; and the last day of the gathering will be devoted to an excursion in the Black Forest. In conjunction with the meeting, there will be an exhibition of gas heating and cooking appliances, coke-stoves, apparatus for public lighting (especially bearing on the use of the incandescent gas-light), and novelties in burners for private use. Inventions in connection with water supply can also be exhibited; and space will be afforded for drawings and models. The exhibition will be under the management of the Directors of the local gas and water works. It will be open from the 16th to the 24th. of June. The arrangements for the meeting will be announced in detail later on.

**The Right of Town Councillors Interested in Gas to Vote on Public Lighting Questions.**—Inquiries are frequently addressed to us as to the right of those members of a municipal corporation who may have an interest in the local gas undertaking to vote on any matter affecting the public lighting. The query as a rule arises on a proposal to introduce some competing system of lighting—generally the electric light—when the legality of such voting is disputed. All we have been able to do has been to quote to our correspondents a section of the Municipal Corporations Act, 1882, bearing upon the point. Alderman Powell, a Director of the Monmouth Gas and Water Company, has just obtained, on behalf of himself and a co-Director, who is one of his colleagues on the Corporation, the opinion of Mr. G. Humphreys, of the Temple, on the question, which has been raised in the Town Council in connection with an electric lighting proposal. It is as follows: "Proceedings at meetings of town councils are regulated by section 22 and Schedule II. of the Municipal Corporations Act, 1882 (45 & 46 Vict., c. 50). By rule 13 of Schedule II., a Council may make Standing Orders for the regulation of their proceedings and business; but, from the fact that none was referred to, I assume that there is no Standing Order of the Monmouth Town Council applicable to the case. That being so, the matter depends on sub-section 3 of section 22 of the Act, which provides that a member of the Council shall not vote upon, or take part in the discussion of, any matter before the Council or a committee in which he has directly or indirectly, by himself or his partner, any pecuniary interest. In my opinion, the mere fact that Mr. Alderman Powell and Mr. Howse are Directors of the Monmouth Gas and Water Company did not cause them to have, within the true meaning of section 22, sub-section 3, a pecuniary interest, directly or indirectly, in the matter in question. I think, therefore, that the Mayor was bound to treat them in all respects in the same way as an ordinary member of the Council; and that the mere fact that they are Directors of the Monmouth Gas and Water Company does not disable them from taking part in the discussion of, or from voting upon, the scheme for electric lighting."

# CORRESPONDENCE.

*[We are not responsible for opinions expressed by correspondents.]*

### The Liability of Corporations for Gas Explosions.

SIR,—Some time ago a very serious explosion took place in the Rue François Miron, Paris, under the following circumstances: Gas and water mains had both been laid beneath the surface of the road, which was subsequently covered with asphalte. The water-main leaked; and the asphalte prevented the water from showing on the surface, while it excavated a large cavity underground, by which the gas-main was deprived of support, and so broke off in the middle. The escaping gas, mixing with air in the cave which the water had created, took fire; and a terrific explosion occurred. There were no less than 35 applications for compensation, which was granted to the amount of £12,000 in cash, and about £1100 a year in life-annuities to the persons injured.

The Court at first decided that these damages were to be paid, as to three-fourths by the City of Paris, to which the water-mains belonged; and as to one-fourth by the Gas Company. The latter body appealed; were exonerated from all blame; and declared entitled to all their costs. The whole damages were put on the municipal body—300,000 francs capital, and 27,000 francs of life-annuities, which would probably come to a still larger sum.

Now this is a case where the Corporation were comparatively innocent; having suffered from an insidious and subterranean defect. How much stronger would be the case if mains were damaged by a heavy steam-roller—a patent cause of danger, working above ground, but possibly causing gas to leak into large sewers, where a magazine of explosive material would be accumulated, to be fired by the furnace of the steam-engine, or by the carelessness of any passer-by. Through the sewers, or a porous subsoil, the gas may leak into adjoining houses; and it is quite clear by the law of France, as well as that of England, that corporations would be liable for all damage sustained.

*Cork, April 6, 1894.* DENNY LANE.

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### The Cost of Maintaining Incandescent Gas-Lights and Electric Lamps.

SIR,—I have read with much interest your abstract of Mr. Bellamy's paper upon "The Science and Progress of Gas Combustion." In the discussion thereon, reported in your issue of the 3rd inst., there appears to have been some misapprehension as to the cost of the upkeep of the incandescent gaslight burner. It is perfectly correct that the Company make a charge of 9s. per burner per annum for maintenance; but it is scarcely fair to call this the cost of upkeep, for the following reasons: The Company's charge for maintenance is not merely to supply all mantles, &c., required for the upkeep of the burner; it also covers a weekly or fortnightly inspection by the Company's employees, when each burner is inspected, the chimney cleaned and everything put in order. The time and labour therefore constitute a very large part of the charge of 9s. per annum; and it is not fair to compare this with the bare charge for purchasing renewal electric lamps.

In making such a comparison, it should be done as follows: One incandescent gaslight burner of 64-candle power requires two mantles per annum at 1s. 9d. each, and (say) two chimneys at 6d. each—making altogether 4s. 6d. Four 16-candle power electric lamps would require eight renewals during the year—say, at 1s. 3d. each (which is the average price), 10s.

I would point out that within twelve months the Company have been enabled to reduce the price of the mantles from 3s. to 1s. 9d. each, owing to the manufacture being on a much larger scale; and there is no doubt that the present price will, in the future, be considerably reduced as the business develops.

L. DE FONBLANQUE, Secretary,
*April 4, 1894.* Incandescent Gas-Light Company, Limited.

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**The Relative Cost of Gas and Steam Engines for Pumping Water.**—The Surveyor of the Uxbridge Local Board has reported to the Water Committee upon the cost of working the gas-engines at present employed for pumping water and the former steam-engines. He shows that the steam engines and pumps, working 14 hours per day, used to cost £555 per annum; while the expense of running the gas-engines and pumps 17 hours per day only amounts to £374 a year.

**Bristol Water-Works Company.**—The ordinary annual meeting of this Company was held last Saturday week. The Chairman (Mr. E. Bush), in moving the adoption of the report, alluded, in the first place, to the decease of Mr. Leach, who had been a Director of the Company for 29 years, and to the retirement from the Board of Mr. Jones. He also referred to the death of Mr. T. Hawksley, who had been their Consulting Engineer for upwards of 20 years, and to the appointment of Mr. C. Hawksley to fill the office. He congratulated the shareholders on the continued prosperity of the concern; for they had had the satisfactory increase of £3723 in the revenue. With regard to the drought last year, he said they went through that period without cutting off the supply. But the extra pumping required cost a good deal of money, besides which the coal strike added largely to the expenditure. They had also to pay £2300 more than formerly under the head of taxes. The result was that the increased expenditure had absorbed all the additional revenue; and they had in consequence to draw upon the reserve fund. The Yeo Valley works, he mentioned, had made satisfactory progress during the year. Mr. Thomas, in seconding the motion, said the revenue for the year amounted to £100,653; and it was the first time in the history of the Company that it had touched £100,000. The motion was carried; and dividends were declared at the rates per annum of 7½ per cent. on the ordinary shares and 5¼ per cent. on the 7 per cent. maximum ordinary stock. An extraordinary meeting was afterwards held, when a resolution was formally passed empowering the issue of £20,000 of 3½ per cent. debenture stock, in lieu of so much of the £60,000 already authorized to be raised by mortgage.

# PARLIAMENTARY INTELLIGENCE.

## HOUSE OF COMMONS.

### Thursday, April 5.

EAST LONDON WATER BILL.

On the motion for the second reading of the above-named Bill,

Mr. STUART moved that it be read a second time that day six months. He reminded the House that the measure now before it was identical with one which was last year rejected by a substantial majority at the second reading stage, on the ground that it was unnecessary, and would prejudge the question of the future water supply of London. On the present occasion, the arguments against the measure were intensified, because the Royal Commission which had inquired into the matter of the water supply of London had before it abundant proof that the East London Water-Works Company had not only an adequate supply for the present, but for many years to come. If the House passed the Bill, it would saddle the future Water Authority for London and the neighbourhood—by which he meant the ratepayers—with a very large amount of capital which would only be required in the event of the supply of London in the future being taken from the Lea and the Thames, and not from outside sources. The interests of the London County Council in this matter were the same as those of Essex, Middlesex, and the neighbouring counties; and they opposed the Bill because it would create unnecessary capital, which the future water authorities for the various districts concerned would have to take over, although it was not at present needed. One portion of the Bill dealt with the laying down of new mains; and he at once said the opponents of the measure had no objection to this question being referred to a Committee of the House. Therefore, if the present Bill was thrown out, and the Company would bring in another dealing with the subject of mains only, he and those who were acting with him would assist in procuring the suspension of the Standing Orders to enable the Bill to be passed in the present session. The promoters of the Bill alleged that, if it did not pass, the new districts which had to be supplied must go without water for an indefinite period, at the imminent risk of seriously endangering sanitary conditions. They spoke as if the increase of population within their district was something alarming. But even according to the evidence of their own able Engineer this was not the case. He showed that, whereas 40 million gallons per day were now required by the Company, on this day five years the total quantity needed, allowing for growth of population, would be 42 million gallons, and ten years hence 44 million gallons. And what were the present supplies of the Company? They had supplied on many occasions as much as 37 million gallons per day from the River Lea, 10 million gallons from the River Thames, and 7 million gallons from their own wells. They had therefore the power, by their own showing, of supplying 54 million gallons per day without any additional provision, or 10 million gallons in excess of their estimated requirements five years hence. All they had to do to get what they required was to use the powers they at present possessed of pumping from their wells and taking water from the Thames. The Royal Commissioners, in their report, recommended that the Company should reduce the quantity of water taken from the Lea, and said that more storeage was required. But if the Company would take their full supply from the Thames and the wells, which amounted to 17 million gallons, they need not draw more than 27 million gallons from the Lea; and this would be sufficient for the next ten years. Just now the Company need not take more than 22 million gallons daily from the Lea. There was a power of inter-sale between the Companies; and therefore the Company could increase by purchase their supply of water from the Thames. The quantity accessible to the Company was 10 million gallons more than their immediate requirements, and this without the outlay of any more capital. The storeage of the Company was the largest in London. The average of the Companies' storeage was six days' supply; but this Company could store 910 million gallons, which was equivalent to 14 or 15 days' consumption. The Official Water Examiner had stated that their storeage was eminently satisfactory, and that their filtering arrangements were above the average. The Company had shown, by their evidence before the Royal Commission, that their pumping power was adequate and efficient; and the same evidence proved that the reservoirs proposed by the Bill were needed only to meet distant requirements. It was unnecessary to urge the doubtful, if not dangerous, source from which the water was to be taken. The Commission reported that, "having regard to the experience of London during the last 30 years, we do not believe any danger exists of the spread of disease by the use of this water, provided there is adequate storeage and filtering." But it was just this storeage and filtering which required large expenditure. Dr. E. Frankland thought the Thames and the Lea ought to be abandoned as sources of supply; and a member of the Commission—Mr. James Mansergh—in giving evidence on behalf of the Birmingham Corporation, had pronounced against the use of water passing through highly-cultivated valleys like those of the Thames and the Lea. He stated that many districts had had to abandon their works in such valleys; and he added: "We do not want to repeat that in Birmingham." It was precisely because he (Mr. Stuart) did not want to repeat this in London more than was inevitable that he opposed the Bill. The Commission did not investigate any source of water outside of the Thames and Lea Valleys; and it was believed that the increase of the supplies from the Thames and the Lea would involve an outlay for storeage and filtering which would exceed the cost of bringing a pure supply from an outside district. The London County Council were perfectly willing to make overtures to the Companies with a view to becoming the Water Authority for London; and they had offered to treat with the Companies for taking over their undertakings on fair and reasonable terms. The Companies, however, had refused to negotiate ("No, no")—well, they did not accept the basis of negotiation which the Council had proposed, nor did they make any counter-proposal. The Council had consequently resolved to move Parliament on the subject, should they be unable to arrange terms with the Companies. The House would understand that the Council did not want to acquire the existing undertakings with a dead limb attached, nor did they wish to have the question prejudged of whether they would have to get their supply from the Companies or from some other source. The point he desired to be decided was not for the Committee to consider, but a point, great and important—as vital as anything ever discussed within the House—bearing upon the health and pockets of the inhabitants of London and the surrounding districts; and he asked the House to prevent the prejudgment of this question that would take place if the Bill were sent to a Committee. [In putting his amendment formally at the close of his speech, the honourable member, by inadvertence, moved—"That the Bill be read a second time"—a slip of the tongue which was greeted with loud Opposition laughter, and cries of "Agreed, agreed."]

Mr. BOULNOIS said he regarded the honourable member who had preceded him as positively an advocate for the Bill being read a second time and going to a Committee; for it was evident to every member that it was quite impossible for the House to master all the details which had been placed before them. The question was essentially a matter for a Committee. It was impossible to dissociate the two Companies [the East London and West Middlesex] whose Bills were before the House. The fact was the Companies had come to the end of their tether as far as capital was concerned; and, if they were to discharge their statutory obligation to supply water, they must have some money, because they were very greatly in need of more reservoir capacity and additional filtering arrangements. The Royal Commission reported favourably, so far as London was concerned; and it was entirely in consequence of their report that these Companies now sought further powers. One paragraph in the report—perhaps the most important one—stated that the Commission were very strongly of opinion that the water supplied to London was of a high standard of excellence and purity, and suitable in quality for all household purposes. The Commissioners were well aware that a prejudice existed against water taken from the Thames and the Lea; but, having regard to the experience of London during the last thirty years, they did not believe that any danger existed of the spread of disease by the use of this water, provided there was adequate storeage and the water was filtered before delivery. It was because the Companies were desirous of providing the necessary reservoir and filtering works that they came to Parliament for further powers. The subject had been very fully considered by the London County Council, and very fully reported upon. Mr. Binnie, their Chief Engineer, had stated: "Mere opposition—and this was what was taking place that day—to the applications of the Companies by the Council must be followed by certain and ignominious defeat, for the whole drift of the evidence placed before the Royal Commissioners by the witnesses for the Council went to show that London requires more water and extended works; and if the Companies are to continue to perform the duties imposed upon them, further powers of some kind must be conferred." If the Companies were to base their case upon Mr. Binnie's statement alone, apart from the opinions of Mr. Bassett Hopkins, the Chairman of the Water Committee of the Council, and of Mr. Cripps, their Parliamentary Agent, they would be justified in making their proposals. He had referred to these opinions in order to show that the County Council, with their eyes open, had come to the House to oppose these Bills, practically against the counsel of their responsible advisers. Were the unfortunate people outside London to be compelled to wait for water till the Council had made up their minds what they should do? The Council admitted that it would require some 15 or 20 years to mature a scheme which was adequate to the water supply of London; and what was to happen to the people in the meanwhile? It was a dog-in-the-manger policy. The Council would do nothing, nor would they allow the Companies to do anything. He hoped the House would not depart from its usual course, but allow the Bill to go before a Committee, where all these matters could be inquired into.

Mr. SHAW LEFEVRE said he thought it would be for the convenience of the House if he stated at once what, in his opinion, was the course which should be followed in regard to the Bill. The London County Council opposed it on the ground that they had not yet had sufficient time allowed them to fully consider the report of the Royal Commission, and that they wished to do so before finally determining upon their future policy. In the second place, they considered that the provisions of the Bill were calculated to prejudice them in their impending negotiations with the Companies. He had come to the conclusion that there was a great deal to be said in favour of the objections raised by the Council. It appeared to him that the Bill was very like the one that was introduced last year. It was true that circumstances had changed, as since then the report of the Royal Commission had come to hand. But the Council had not yet had time to decide upon what course they should follow. The Commission had recommended that the water supply should be drawn principally from the Thames; but they had recommended also the formation of extensive reservoirs, and the adoption of measures for preventing the pollution of the tributaries of the Upper Thames. On the other hand, they did not make any report as to the cost of putting such proposals into effect. The scheme now before the House was not in accordance with the recommendations which the Royal Commission considered to be the most important. Having regard to all the circumstances of the case, he was in favour of further time being given for a consideration of the whole subject. He wished also to point out that, if the Bills were passed, the Companies would become far more independent, and more able to dictate terms to the Council; and the Council were therefore justified in asking for time. In his opinion, a delay of a year or two could not be seriously prejudicial to the comfort or health of the people of London. He had felt some hesitation in coming to this conclusion; but, after all, the Council were the best judges in these matters. They must know the wants of their own people; and it appeared to him that, when a great Municipality like London came to Parliament and asked it to grant a delay of another year in a question so vitaley affecting their interests as this, they were entitled to a careful and patient hearing. His advice, therefore, was that the House should not allow the Bill to be proceeded with this year. The Council would then be in a position to make further inquiries in the interval. He thought the House ought to expect that next year the Council should

come to Parliament with a definite scheme and a definite policy; and that the Water Companies ought, on their part, to take advantage of the interval to combine together, in order to produce a scheme for carrying out the recommendations of the Royal Commission for improving the condition of the water supply of London. It was on these grounds that, in his opinion, the House should postpone the consideration of this vital question for another year.

Mr. GOSCHEN said he should have been astonished at the course which the Government had taken upon this question, if anything the Government did was now likely to cause astonishment. The right honourable gentleman said that, on the whole, he was prepared to recommend the House to vote against these Bills. But there was a certain amount of timidity in the way in which he uttered his sentiments; and it was not surprising. He (Mr. Goschen) had the honour to represent a London constituency of consumers of water; and he maintained that they had as much right to be heard in regard to this matter as the Water Companies or the County Council. The right honourable gentleman spoke as if the whole matter merely concerned the Council. But Essex was deeply interested in this matter; and the Chairman of the Essex County Council was imploring the authorities that one of these Bills should be proceeded with. Was Essex to be starved with regard to water, in order to give the London County Council an opportunity of elaborating a scheme of purchase? He was not thinking of the Water Companies, but of the water consumers and what evidence had they had that this delay was in the least justified? The right honourable gentleman, as President of the Local Government Board, was deeply interested in the sanitary condition of London; and, unless he had a stronger conviction than he had expressed, he ought not to have run the serious risk involved by delaying these Bills. Moreover, the question was not whether they were to be carried or not, it was whether they were to be examined or not. The question was eminently one for a Select Committee, or it might be examined by a Hybrid Committee; and surely the right honourable gentleman would be justified in trusting the question to such a Committee, which would be a microcosm and miniature of the House. The Government might have saved time by letting a Select Committee deal with this matter; but he suspected that one of their reasons for allowing the debate to proceed was that the vote in that House would be different from that in a Committee, and that, at the moment when they were told that Scotland and Ireland ought to manage their own business, Scotch and Irish votes were to deprive the Metropolis of a better supply of water for another year. It was, moreover, to be remembered that the House was to take the action suggested by the Government at the bidding of the London County Council. There was no disguising that fact. Might he ask those members for Scotland who thought that that country ought to manage its own business to abstain from taking any part in the coming division. They would then see the sincerity of their desire that each country should have the control of its own affairs. He made the same appeal to the Welsh and Irish members. If the Metropolis decided this matter for itself, he was pretty sure how it would be settled. The Metropolis wanted the water, and desired an inquiry, the result of which they were ready to adopt—the ratepayers and consumers having perfect confidence in the ordinary forms of that House.

Mr. J. S. WALLACE said that his constituency (Limehouse) considered that there was no urgency in this matter for another year, and did not think any public interest would be imperilled by the delay. They, therefore, appealed to the House to throw out the Bills, as the time for proceeding with them was inopportune, seeing that the County Council would probably, in the near future, be empowered to acquire the water supply of London.

Mr. BANBURY said the district that would be affected by the Bill was a division of Essex, which was not under the London County Council at all. The Chairman of the Essex County Council (Mr. A. Johnston) had written to the papers in opposition to the position taken by the London County Council, and expressing the hope that the Bill would pass. The money was to be expended in providing increased storeage capacity, mains, and pumping power. If the Council purchased the Company's undertaking, they would have to distribute the water somehow; and this could not be done without adequate reservoirs, mains, and machinery. What prompted the attitude taken by the Council was the desire to purchase the Company's property at a cheap rate. If the powers now applied for were refused, the Company could not carry out their statutory undertakings, their stock would be depreciated, and the Council would be able to purchase at a low figure.

Mr. BENN said it might seem a very invidious thing on the part of the London County Council to ask the House to throw out the Bill; but the House ought to know how the Council had attempted to deal with the matter in another way. As soon as the report of the Royal Commission was published, they decided to approach the Water Companies in a businesslike way; and they passed a resolution, a copy of which was forwarded to the East London Company. It stated that the Council were prepared to enter into negotiations for the purchase of the water undertakings, or one or more of them, at a fair and reasonable price, on the basis of a desire to purchase and a willingness to sell, having regard to any circumstances or statutory provisions, &c., affecting the present and prospective profits of the Company, &c.; and that, if a satisfactory arrangement could not be mutually agreed upon, application should be made to Parliament to determine the manner and conditions of the transfer, provided that no monopoly on the part of the Water Companies was recognized. This was a fair basis of negotiation. The Company sent a reply; and he challenged the honourable member opposite (Mr. Banbury) to produce it.

Mr. BANBURY read the letter. It set forth that the Directors did not see their way to enter into negotiations on the basis indicated in the resolution, but were prepared carefully to consider any definite proposal for the purchase of their undertaking.

Mr. BENN said it would be obvious to the House that the resolution of the Council invited some counter-proposal on the part of the Company. The Council clearly and definitely stated their views; and if they were not sufficiently reasonable, surely it was for the Company to consent to arbitration, which was suggested in the basis of negotiations. In this matter, the Council had tried to do what other municipalities of the kingdom had successfully done in respect of their water supplies. The fact was, the Water Companies had determined to have nothing to do with the Council; and therefore that body asked Parliament to take the extreme measure of rejecting the present Bill, the main object of which was the inflation of the value of the undertaking concerned, in view of probable purchase. A further point against allowing the measure to become law was that, if the Council became the Water Authority of the Metropolis, and amalgamation of the Water Companies' undertakings ensued, many of the works now proposed would be unnecessary.

Mr. GROVE considered that in this matter the Council were unjustly infringing the rights of other local authorities. He asked the House whether his constituents in West Ham were to go thirsty and dirty because members of the London Council could not make up their minds. There were 224,000 inhabitants in North-west Ham; and he was frequently told by the manufacturers that the supply of water was not sufficient to carry on their trades at a proper pressure; while his poorer constituents complained that they were in danger of running short of water. These facts went a long way against the theories of the Council. His constituents protested against the claim of the Council to go into Essex and say they would manage the water affairs of certain parts of that county, as well as those of the County of London. Should the Bill be read a second time, he would, if in order, propose an instruction to the Committee to insert a clause in it providing that, in the event of the undertaking of the Company being sold to the Council, the new shares to be created under the Bill should be sold at par.

Colonel HUGHES inquired what was to be done in reference to the water supply of the Metropolis between the present time and the period when the Council acquired the water undertakings. Surely, he said, there could be no objection to sending the Bill to a Select Committee, before which the cases of the promoters and the Council could be fully discussed.

Mr. CAINE pointed out that the present authority for the water supply of London consisted of the Water Companies; and in the absence of any scheme on the part of the Council which might induce him to vote for the postponement of the Bill before the House, he should vote for affording the East London Company the opportunity of going before a Committee, and having their proposal considered.

Mr. S. BUXTON said he believed his friend had addressed the House as one of the Directors of the New River Company——

Mr. CAINE denied this, though he admitted that he was a Director of the Company as representative of an Insurance Company. He had, however, no personal interest in the Company, and had handed over all his fees to his own Company.

Mr. BUXTON said he had only wished the House to understand that his friend was connected with one of the various interests which had been represented in the debate. Judging by the speech of the right honourable gentleman opposite (Mr. Goschen), it was evident that the position taken by the Government was not appreciated. What they said was that this was not a question as to the merits of the particular scheme of the East London Water Company, but rather one of principle, as to whether, before the London County Council had had an opportunity of fully considering the report of the Royal Commission on the Metropolitan Water Supply, matters such as were put forward by this Bill should be dealt with and decided by the House. The amount for which this and another Company were asking involved an expenditure of 1¼ millions sterling; and the matter was therefore one of some magnitude. The right honourable gentleman (Mr. Goschen) had stated that he spoke for his constituents as consumers. But he (Mr. Buxton), as one of the right honourable gentleman's constituents, spoke as a ratepayer and consumer; and, in his opinion, the ratepayers and consumers were entitled to say that, before so enormous an outlay was sanctioned, the Council ought to have the opportunity of considering the question as a whole.

Mr. GOSCHEN remarked that what he had said was that he had spoken both as a ratepayer and a consumer.

Mr. BUXTON went on to say that, although the Royal Commission had reported, time was needed by the Council to consider the report; and, in the meanwhile, it was not deemed advisable that powers should be given for the expenditure of the large amount which was asked for by the two Companies whose Bills were before the House. The point was whether the Council should buy up the undertakings of the Water Companies, or whether the Companies should continue to supply the Metropolis. The Council were prepared to accept any reasonable proposal on the part of the Companies; and, as nothing in the nature of urgency had been shown, there was no reason why the Bill under discussion should not be postponed for another year.

Sir R. E. WEBSTER said he could not refrain from alluding to the sneering reference to the member for Bradford (Mr. Caine), which he thought was quite uncalled for, especially on the part of one speaking on behalf of the Government from the Treasury Bench. With regard to the question before the House, all that was asked was that the Bill should be examined by a Committee. If the Council had any real case against the Company, the proper place to discuss it was a committee-room, where witnesses supporting it could be cross-examined. One point which had been overlooked was this: On what ground was the Council to say that the inhabitants of Essex should not have water? The Council were, in this respect, arrogating to themselves a position which they had no right to adopt. He hoped the House would see that the whole question ought to be thoroughly examined; and this could only take place before a Select Committee.

Mr. PICKERSGILL, referring to the complaints as to the scarcity of water in West Ham, said that these had reached the London County Council; and they had been found to arise from the practices of the East London Company.

Major RASCH said they all knew that the design of the Council was to cripple the Companies first, and afterwards to buy up their works at half price. As he had been Chairman of a Water Company for ten years, he possessed an intimate knowledge of the subject. The matter was perfectly simple. The Royal Commissioners had interdicted the East London Company from taking more water from the Lea; and therefore they had to construct additional storeage reservoirs. This they could not do without raising fresh capital. Even the Council

would be unable to do that. In Essex it was thought that the Council had their hands full enough at present, and had better mind their own business, and leave Essex alone.

Mr. A. O'Connor stated that his intention was to vote for the Bill. He had hesitated, however, to take this course, because he should be pleased to help the Council in all their claims within the sphere of their jurisdiction; but he could not follow them into Essex, when he found the Council for that county supporting the other side. With regard to the reference of the right honourable gentleman (Mr. Goschen) to Irish members taking part in the division, he would point out that there was as large an Irish population in London as in Dublin, and that a considerable portion of them were resident in the district affected by the Bill.

Mr. Burns pointed out that, as the report of the Royal Commission was only issued last September, the Council had not had time to consider it. It was to the interest of the Council to promptly deal with it; and he was convinced that it would be considered fairly and reasonably with regard to the rights of the Water Companies. He thought they were not claiming too much when they asked for three months in which to look into a matter dealing with property valued at from twenty to forty millions sterling. As to the argument that the Council ought not to go outside their own jurisdiction, he pointed out that the adjoining parts of Essex had imposed the main drainage cost on London, that West Ham was asking to have the Equalization of Rates Bill applied to it, and that when the undertakings of the Water Companies were bought up, it was the Council who would have to find the money. If they were to "pay the piper," they ought to have the privilege of choosing the tune.

Mr. Chamberlain said that he was not a shareholder in any Water Company. He felt that, sooner or later, the London County Council were bound to decide whether or not they would purchase the undertakings of the Water Companies; and he hoped they would buy them. Up to the present, however, they had not come to any decision; and the question for consideration was whether, until they should have arrived at a final determination, no Water Company in London was to be permitted to increase their capital. The Council put forward a most extraordinary claim. Never had a similar demand for delay been granted on the application of any municipality. Birmingham had some knowledge of the ways of the Council. When Birmingham asked for power to obtain a supply of water from the Welsh hills—saying that within a short time the town would probably suffer from drought—the Council opposed the scheme, and averred that the statement was untrue. They said there would be no drought; but there was. This showed how very little reliance could be placed upon their scientific knowledge. The Council strenuously opposed the scheme—asking for time to enable them to decide whether they might not themselves require the particular water supply which Birmingham had selected. The Council should make up their minds to deal fairly and speedily with the matter now under consideration. Their demand for delay was monstrous. If the representatives of the Council were prepared to make the East London Company the same offer that was made to the Birmingham Water Company by the Municipality, he was sure it would be accepted. The right course was for the Council to make up their minds as to what was the fair value of the property of the East London Company, and to submit an offer accordingly. If the terms were refused, let the Council then apply to Parliament for official powers. It was monstrous that, before taking this course, they should seek to interfere with every scheme for the extension of the water supply. He had never known a Bill to be treated in this way before. He must say that it was a most dangerous precedent that a Private Bill should be dealt with in that House upon political considerations.

The House then divided, when the numbers were: For the second reading, 228; against, 227—majority, 1.

The Bill was then read a second time.

### THAMES CONSERVANCY BILL

Sir F. Dixon-Hartland, in moving the second reading of the above-named Bill, explained that last year, in the London County Council's General Powers Bill, there was a clause relating to the Conservators of the Thames. It was not considered that the upper part of the Thames was fairly treated; and a compromise was arrived at. In the result, three members were to be added to the London Board, and four members to the number of the representatives of the upper River; and a Bill was to be brought in by the Conservators this year, or, if they did not submit one, the Council were to promote one in the year following. In pursuance of this compromise, the Conservators promoted the present Bill. If there was no other recommendation of it, it certainly had this one, that it did away with no less than 32 existing Acts by which the Conservancy governed the River Thames—some of the Acts going back to the days of James I. In giving an outline of the Bill, he explained that the Water Companies had parliamentary power to take a certain amount of water from the river; and agreements had been made with the Conservancy, by which the Companies were allowed to take an increased quantity. The Council raised the question that these agreements were not valid; and they wished to be able to treat them as invalid for the purpose of buying the works of the Companies at a lower rate than they calculated they could purchase for at present. The Conservators had come to the conclusion that the agreements should remain. They would not break faith with the Companies in any shape whatever, though they did not propose by the present Bill to give them any further statutory powers. They simply left matters on their existing basis. Everyone would see that they were acting fairly by the Companies as well as to the ratepayers of London. At the present time, the Companies were drawing from the river 110 million gallons; and they had power to take 130 million gallons. This power would remain under the Bill. The Conservancy had taken the deepest interest in the purity of the Thames; and the public would concede that they had done their duty. They had not sold their water in any way to the Companies. They had spent certain sums of money absolutely for the benefit of the Companies; and, in return, the Conservancy had received certain sums from the Companies to enable them to carry out their works. The Conservancy had certainly prevented a very large quantity of pollution. They had equalized the flow of the water; and they had ensured in the summer a constant supply by widening and deepening the reaches, and by other works. The Bill ought to be read a second time, and referred to a Select Committee. The Conservators did not look upon themselves as representing simply the interest of the people of London. They considered that the inhabitants of Oxford, Windsor, Reading, Richmond, and other places in Gloucester, Wilts, Bucks, and Berks were equally interested in the Thames with the county of Middlesex. The scheme of the Board would do equal justice to all.

Mr. Stuart said he did not propose to move the amendment he had on the paper for the rejection of the Bill, because the reasons which had induced him to give notice of that intention had been removed by an arrangement which had been come to with the promoters. His object in opposing the Bill was that it gave larger power to the various Water Companies than those they now possessed to draw water from the Thames. His view was that the rights of the Companies, whatever they might be at present, should not in any way be interfered with by the Bill; and this, he believed, had been assented to. Though not objecting on the second reading, it must not be understood that the London County Council approved of the Bill; and, therefore, he reserved to himself the right to take what action he considered necessary on the third reading, especially in view of the provisions as to the representation on the Board of Conservancy and the raising of money.

After a short discussion, the Bill was read a second time.

Mr. Stuart moved—"That it be an instruction to the Committee on the Bill that no further powers of taking water from the River Thames than may now be legally exercised be given by the Bill to the Water Companies; and that, as far as necessary, the Bill be amended to give effect to this instruction."

This was agreed to.

### WEST MIDDLESEX WATER BILL.

On the motion for the second reading of this Bill,

Mr. Stuart said that, after the recent division, he should not proceed with his opposition to the second reading of the Bill. Although the circumstances of the measure were different from those of the East London Water Bill, the main question which he wished to have determined—whether the House should decide in regard to such Bills, or leave this duty to a Committee—had already been settled by the previous vote. On behalf of the London County Council, he should place on the paper certain instructions to the Committee, which would have to come before the House; and, therefore, he would for the present withdraw his opposition to the Bill.

The motion was agreed to; and the Bill was read a second time.

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The following additional private members' Bills have been presented and read the first time:—

Boards of Conciliation Bill, Employers' Liability Bill, Hours of Labour (Local Authorities', &c., Servants) Bill, Patent Agents' Registration Bill.

The following progress has been made with Bills:—

The Examiners reported that the Standing Orders not complied with in the case of the Cardiff Corporation Bill ought to be dispensed with; and the Bill was ordered to be brought in by Sir E. Reed and Mr. A. Thomas. This was subsequently done, and the Bill read the first time.

Standing Orders complied with, and Bills ordered for second reading: Southwark and Vauxhall Water Bill, Torquay Gas Bill.

Bills read a second time and committed: Harrow and Stanmore Gas Bill, Hebden Bridge Gas Bill.

Bill reported, without amendment: Alloa Water Bill.

Petitions against the East London Water Bill were presented from the Corporation of West Ham, the East Ham and Woodford Local Boards, and the Guardians of the Poor of the Epping Union.

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**Rochdale Corporation Gas Supply.**—The amount of gas consumed in Rochdale during the Corporation financial year, which ended on the 25th ult., exceeded the quantity for the previous twelve months by 6,986,000 feet; the total being 392,651,000 cubic feet. Notwithstanding, however, the increase of 3d. per 1000 feet in the price of gas, the loss entailed by the higher price of coal owing to the miners' dispute will not be covered.

**Obtaining Gas by Fraud at Leeds.**—Richard Chambers, of Pembroke Street, Leeds, appeared before the Stipendiary Magistrate at the Town Hall, last Tuesday, on the charge of improperly consuming gas belonging to the Corporation. It was the old story. The outlet-pipe of the meter and the service-pipe had been connected by a piece of india-rubber tubing; and the gas was consumed in a cooking-stove. The Magistrate imposed a penalty of £3, with an additional penalty of £1, including costs.

**Shocking Fatality on the Liverpool Water-Works.**—Mr. Joseph Bowyer (aged 30), who was engaged as an inspector on the Vyrnwy line of pipes in the neighbourhood of Norton, near Runcorn, met with an awful death on Monday afternoon last week. He had informed a workman named Donoghue that he was going down a shaft of the tunnel for the purpose of using the telephone. A few minutes later Donoghue, hearing a peculiar noise, descended the shaft, and there discovered Mr. Bowyer's dead body wedged between the suction-pipes—a distance of 70 feet from the surface—in about 7 feet of water.

**West Gloucestershire Water Company.**—The half-yearly meeting of this Company was held on the 31st ult. The report stated that 359 additional services had been laid; making the houses and other properties supplied 4879, which were estimated to yield a water-rental of £3763. The accounts for the six months showed a net profit of £423; making, with the balance brought forward, £635. From this the Directors recommended the declaration of a dividend at the rate of 1¼ per cent. per annum. It was stated by the Chairman (Mr. Enoch Horton) that during the past four years £14,000 had been expended in extending the mains. The report was adopted.

# MISCELLANEOUS NEWS.

## COMMERCIAL GAS COMPANY.

The One Hundredth Half-Yearly Meeting of this Company was held last Thursday, at the Cannon Street Hotel—Mr. J. Blacket Gill in the chair.

The Secretary (Mr. H. D. Ellis) read the notice convening the meeting, and the minutes of the previous meeting.

The Chairman, in moving the adoption of the report (*ante*, p. 617), said there was an old proverb which told them it was an ill wind that blew no one any good. Probably they would recollect that when he last addressed them, about six months ago, a very ill wind was blowing in the North, which produced any amount of misery, trouble, and confusion by the unhappy differences between the miners and their masters. But that wind, although it blew so ill in the North, blew on them, as a Company, in a very different manner, with the result that the Board were enabled to submit on the present occasion a statement of accounts which he felt quite sure must be regarded as particularly satisfactory. Londoners, denuded of coal, were obliged to pay high prices for their fuel; and the consequence was that the Company had been enabled to get rid of their coke at a very satisfactory figure. Their coke produced £11,266 more in the half year under review than in the corresponding period of the previous year. At the same time, their coal cost £10,241 less. The carbonizing wages were about £1360 less. It was entirely due to these advantageous circumstances—namely, the high price received for their residuals, and the low price paid for their coal—that the accounts were of so exceptional a character. They were very pleased to receive what might be called a godsend; and they were glad to have such a handsome balance at the credit of profit and loss. But they must not look for it each half year. It was altogether exceptional; and it might never occur again. For their tar they obtained £225 more; and for their sulphate of ammonia, an additional £2348. So that the total amount received for residuals was £13,853 extra. There was a reverse to every picture; and there was to theirs. They found that their gas-rental was £2732 less; or about 5 per cent. This was a matter which ought to be mentioned; and it gave the Board a certain amount of concern. They did not like their main article of production to fall off half year after half year. Most companies had, however, been in the same boat; and he believed the majority of chairmen of gas companies explained it away by pointing to the exceptional weather, and also by the exceptionally bad state of business. When business was bad, they probably suffered in the East-end more than anywhere else. They had placed a fair sum to depreciation this half year, which was right and proper; and their bad debts were more by £270. In the end, it came to this—that it had cost £132,881 to earn £192,013. The consequence was there remained a balance of £59,132. They proposed to pay the usual dividend of 12½ per cent. on the old stock and 9¼ per cent. on the new stock. This was the same the proprietors received last year; and for many reasons the Board thought it best not to make any change. They knew that for a long time past some large dips had been made into their reserves of undivided profits, with the result that they swept them all away; and now that they had the chance of recouping some of them, it was felt to be wise to do so. It should also be recollected that, in the current half year, they would be working with lower prices for gas; and so this money would come in handy to keep up their dividends to the usual rate. Since they last met, the Board had reduced the price by 2d. per 1000 cubic feet. It was with real regret the Directors had to raise the price, and with great pleasure they had been able to lower it. They were strongly of opinion that there was nothing which rendered their position so secure and firm as keeping the price of gas as low as possible. This was a cardinal point in their creed, which they endeavoured to carry out. During the past half year, they had had 531 coin-meters—penny-in-the-slot meters—fixed in their district. It was too early to speak positively about them. But it appeared to him that, although their profit might be somewhat small upon them, it must be a good thing to have 531 more new consumers; and the Board hoped that those people who had left the oil-shops would stand by them, and feel that the Company were doing them a really good turn. It appeared to him that, in giving the working man a good light to light his room or to boil his water for a period of six hours at the cost of only 1d., they were pioneers of progress, and were assisting the working class very materially. He hoped and believed that eventually, when he was able to speak more positively on the matter, to find that the coin-meters were not only a convenience to working people but also a financial success to the Company. Of course, in their district—which was circumscribed, and where their greatest enemy was cheap oil, because electricity (that handmaid of luxury) could not compete with them strongly—it was necessary to endeavour to serve, as far as possible, the working class. They now had 4327 stoves out, as against 4011 last year. He might say generally that their works were in good order; and their workmen, he believed, were satisfied, happy, and contented. He was exceedingly pleased at Christmas when the Engineer reported to him that everything went off in a particularly quiet and satisfactory manner—that there was no drunkenness or riotousness, but that the men set about their work in a manner which they must all approve. Although they paid their men good wages, they did not grudge them a farthing if they succeeded in keeping free from the public-house, and put by something for a rainy day. No doubt the proprietors had noticed in the papers a reference to what was described as a coal-ring, which was formed (or about to be formed) in the North, for the purpose, he believed, of frightening London Gas Companies. Let him say that they had no fear whatever on that score. The production of coal was so enormous, that no ring could keep up a fictitious price for any considerable length of time. The price of coal would certainly follow the inexorable law of supply and demand; and if the trade of the country were prosperous, and they had to pay a little more for their coal, it would be good for the country. But if, on the contrary, trade kept bad, they would possibly pay about the same, or a trifle more, which would be a good thing for them. They desired to get their coal at a fair and reasonable rate; and he hoped, when making their contracts in the summer, they would be able to do so. He did not propose to weary the meeting with a long speech, although he could give any number of figures relating to the business of the Company. The history of the Company, however, was all contained in the report which had been sent out; and he was afraid that, if he went into many details, they would not be gladdened regularly by the presence of many of the proprietors whom they welcomed on this occasion, as time to them meant money. But, as business men, they liked to meet the Directors, and hear from the Chairman the state of the Company. He was happy to be able to say that it was in a most thoroughly sound and healthy condition; and if, as he hoped, they would be able to make their coal contracts for next year on satisfactory terms—although he did not know that they would be able to obtain quite so favourable a rate as for this half year—he trusted that the Board would have satisfactory accounts to place before the proprietors at the next meeting. They would probably have noticed by the report that this was the hundredth half-yearly meeting. Many of the proprietors would probably recollect that that Company was amalgamated with the old Ratcliff Company in the year 1875. The Ratcliff was incorporated in 1823; and he was reading the previous night how, in 1829, the price charged by them for gas was 12s. 9d. per 1000 cubic feet. The Commercial Company in 1850 charged 5s. per 1000 cubic feet; and as late as 1875, 3s. 9d. Their price now was down to 2s. 7d., which appeared to him to be a fair and reasonable one. It showed the advantage of the working of the sliding-scale, which no doubt was as much in favour of the proprietors as the consumers. They were in a partnership, and worked together; and he hoped they would continue amicably to do so for many years to come. He then moved—"That the report and accounts be received, adopted, and entered on the minutes."

Mr. H. L. Hammack seconded the motion, which was carried unanimously, without discussion.

The Chairman then moved the following resolution: "That, pursuant to the recommendation of the Board of Directors, a dividend be declared for the half year ending the 31st of December, 1893, after the several rates of 12½ per cent. on the old stock, and 9¼ per cent. on the new stock, in both cases less income-tax; and that the warrants for the same be forwarded by post to the proprietors."

Mr. Hammack seconded the motion, which was agreed to.

The Chairman next moved the re-election of the retiring Directors—Mr. T. Bevan, Mr. W. G. Bradshaw, and Mr. H. L. Hammack. These three gentlemen, he said, were very useful members of the Board. Mr. Bevan had great mercantile experience; Mr. Bradshaw was the able son of their late lamented and most valued Chairman; and Mr. Hammack was the senior member of the Board, and they rejoiced to see him present again on this occasion in renewed health.

Sir J. C. R. Colomb seconded the proposal, which was carried.

Mr. Hammack briefly thanked the meeting, on behalf of himself and his colleagues, for their re-election; and he remarked that it was a great pleasure to be connected with the Company on the occasion of its Jubilee.

On the motion of Mr. Gould, seconded by Mr. Fairclough, Mr. A. G. Hounsham was re-elected an Auditor.

Mr. R. Hesketh Jones, J.P., moved a vote of thanks to the Chairman; and, in the course of his remarks, he congratulated the Board upon the satisfactory way in which they had conducted their affairs, and expressed his warm appreciation of their decision to create a nest-egg for future contingencies.

Mr. Cecil seconded the motion, which was agreed to.

The Chairman thanked the meeting, on behalf of his co-Directors and himself, for the vote. On the part of their Deputy-Chairman (Mr. Robert Jones) he had to express regret that he was not present. For a great number of years, Mr. Jones had been with them; but he was not quite so young as he used to be, although in fairly good health. It was to be hoped that, after enjoying his holiday, Mr. Jones would come back strong again, and be able once more to take part in their councils. Before sitting down, he proposed a hearty vote of thanks to the Engineer, Secretary, Accountant, and all the officials of the Company. Circumstances some few years since were very much against them. It was only eighteen months ago when, instead of their profits being £59,000, they were £22,000; and although it was no doubt harder to manage a Company when things were not prosperous, he thought all the gentlemen he had mentioned deserved the thanks of the meeting for their work during the past half year. He was certain they could not have any one more keenly attached to their interest, and who strove more earnestly to promote the welfare of the Company, than their able Engineer, Mr. H. E. Jones. The Directors might do all they could, as they did; but at the same time they must always be greatly indebted to the man who had, as Mr. Jones had, the whole affair at his fingers' ends, for many of the results they saw in the accounts. Their Secretary, Mr. Ellis, fulfilled all they could possibly wish of him; and a more able, conscientious, and accomplished Secretary no company could wish to have. It also gave him great pleasure to bear willing testimony to the virtues of all their officers, who to a man did their best to promote the prosperity of the Company.

The vote was then cordially agreed to.

The Engineer (Mr. H. E. Jones), in thanking the meeting for the vote, on behalf of himself and the staff associated with him, said they had never had an easier time than in the past half year. The misfortunes of their neighbours in connection with the coal strike had helped to sell their residuals well; and money had come in by easy means. But, as the Chairman had said, they had had to face different times; and during that dreary period which they all recollected—when they were paying the highest prices for the worst coal he ever saw—their nose was kept to the grindstone. He should like to say something about the supply of gas by the slot-meters. The Chairman had told them they had upwards of 500 of them in use; and he might add that they had applications for twice this number. Without increasing their staff (which would perhaps be unwise), these could not be supplied, except after keeping the consumers waiting a time. Whether in the long run there would be a great or a little profit attaching to this class of business, he could not say; but there was one conclusion to be drawn from these applications—namely, that there was an enormous population asking to be supplied with gas. They had left off canvassing to any

extent, as orders now came flowing in on their own account. Surely there must be some advantage to be derived from supplying so large a want; and it was perhaps better to depend for their future on a very large number of small consumers than on a select number of larger ones. The number of consumers per mile of main in several of the provincial companies in the North was as high as 132; in Glasgow, it was 527; and at Derby and Preston, 196 and 167 respectively—as against 80 in London. He thought this showed that there was a field for exploitation in London, if only they devoted themselves to it. As to the small difficulties and trouble arising from the coin-meters, he thought they would be able to deal with them, when they had had more experience, in such a way that the meters would not cost any more to attend to than the bigger ones.

The SECRETARY also thanked the meeting, on behalf of himself and those he represented, for the kind way in which the vote of thanks had been accorded them.

The proceedings then terminated.

## ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The Half-Yearly Meeting of this Company was held on the 31st ult.—Mr. E. FOTTRELL, J.P., in the chair.

The SECRETARY and GENERAL MANAGER (Mr. W. F. Cotton) read the notice convening the meeting; and it was agreed to take as read the Directors' report and the statement of accounts, from which some particulars were given in last week's issue.

The CHAIRMAN, in moving the adoption of the report and accounts, congratulated the shareholders on the results of the half-year's working. The accounts, he said, showed a falling off in the quantity of coal carbonized to the extent of about 860 tons; and, as a consequence, a reduction in the amount of gas sold when compared with the corresponding period of 1892. This was attributable to the very bright days and high temperature which prevailed; but on the other hand, a considerable improvement had taken place in the receipts for residuals, more particularly for sulphate of ammonia. This result, combined with a reduction in the cost of coal, enabled the Directors to submit a balance-sheet showing a profit of £34,892; being £4538 in excess of the corresponding period, when it was found necessary to take £3502 from the reserve fund to pay the usual dividend. The profits would have been larger but for the disastrous coal strike, which necessitated the keeping of a large stock of coal on the works in anticipation of a scarcity; and when he mentioned that to store a ton of coal, and subsequently remove it to the retorts, cost about 10d., the shareholders would quite understand the expense they were put to. However, compared with many companies and local authorities, they had been very fortunate; some of them having sustained enormous losses, amounting in certain instances to as much as £20,000 in the half year. The Directors were extending the use of the penny-in-the-slot meters; and the consumption of gas for cooking and heating was also growing. The Directors were again arranging for the delivery of a course of lectures on cookery, at which the use of gas cooking apparatus would be explained. He was glad to say that during the miners' strike, the coal contractors served the Company well, leaving nothing undone in their endeavours to keep up supplies; and were it not for the severe storms of November, and the scarcity of trucks at Newcastle, caused by the great demand for coal from the midland counties, the necessity of purchasing coal outside that contracted for would not have arisen. There was one other matter to which he wished to direct attention. Most of the shareholders must have seen reports in the newspapers for some months past, signed by order of the Corporation Gas Committee. They appeared in a tabulated form, and alleged that the illuminating power of the gas, which the Company were bound to supply to a standard of 16 candles, was only of from 13 to 14 candle power. He was not going to discuss the question there, beyond stating that the reports were absolutely unsound. The question was one which, sooner or later, would have to be settled elsewhere; but in the meantime it was but right to inform the public that the testings, of which the reports referred to were said to be the results, were not made officially. They were not made open and above board, such as was done in every other city and town in the kingdom, where gas was officially tested in accordance with the general statutes applying to gas undertakings; and they were therefore valueless. With regard to the works, they were at present resheeting one of the large gasholders that had been in use for more than 30 years; and when completed, it would be as good as new, and much improved in respect of being able to give a better pressure of gas. In conclusion, he bore testimony to the efficiency that the officers, particularly Mr. Cotton, had displayed during the very trying times the Company had passed through.

Mr. J. R. WIGHAM seconded the motion, which was carried.

The CHAIRMAN then moved that a dividend at the rate of 10½ per cent. on the old shares, and at the rate of 7½ per cent. on the new shares, be declared.

Mr. DRUMMOND seconded the motion, which was agreed to.

The retiring Directors (Messrs. Pim and Murphy and Alderman Kernan) were re-appointed; and afterwards the Directors and officials were heartily thanked for their services.

The CHAIRMAN, in responding, assured the shareholders that the Board had had some hard days' work to keep matters right; but they were ably seconded by their efficient Secretary, who had been night and day attending to the interests of the Company.

Mr. COTTON also acknowledged the vote, remarking that they had been working pretty hard together for the past twenty years; and although sometimes the profits did not turn out as much as they anticipated, still they looked forward to the day when they could realize the same profits again, and he was not a bit uneasy at the prospect.

**Reduction in the Price of Gas at Rossendale.**—The Directors of the Rossendale Union Gas Company have given notice that, from the commencement of the present quarter, the price of gas will be reduced 2d. per 1000 cubic feet; making it 3s. 7d. Six months ago it was raised from 3s. 4d. to 3s. 9d.

## EAST LONDON WATER-WORKS COMPANY.

The Half-Yearly General Assembly of the Proprietors was held at the Company's Office, St. Helen's Place, Bishopsgate, last Thursday, under the presidency of Mr. GEORGE BANBURY.

The SECRETARY (Mr. I. A. Crookenden) having read the notice of meeting, the report and accounts were taken as read (*ante*, p. 620).

The CHAIRMAN stated that the revenue resulting from the last half of 1893—the period under consideration—was always more remunerative than that of the preceding six months; and when they compared the present rentals with those of the same time of 1892, the former gave an increase of £6629. But this considerable sum to the good had been nearly eaten up by the extra outlay in expenditure, which had been absolutely necessary. Thus, in order that their high standard for purity of supply might be in no way jeopardized, they spent £3300 in the purchase of fresh sand for filtration. This, added to the outlay for a similar purpose mentioned at their last meeting, made nearly £5000 expended during the year under this head. Sand was, of course, a most essential element in the conduct of their business, as they could not filter without it; but it was somewhat expensive, as they might value the present quantity which they had in use at about £70,000. The increase in the price of coal, and the special contribution to the Lea Conservancy, mainly accounted for the other items of additional outlay. Their law expenses were still heavy. They had averaged £3000 per annum for the last five years; and during the present half year there were certainly no probabilities of their showing any decrease. These serious calls upon them were not caused by any aggressive action on their part, but were necessitated by their having to defend their property, their authorized rights, and the position accorded to them by Parliament. They had lately had two important suits as to the propriety of their charges. They had won them both, with costs; but he need hardly tell the proprietors that the taxed costs received left a very large sum for the Company to pay, although they were proved to have been right "all along the line." He might mention that in one of these suits it was urged, among other points, that 4s. per annum for a bath used by two families was an extortionate charge; but the Judge, as one would naturally expect, took a decidedly opposite view. During the past six months, considerable advance had been made in the new works required to supply their new neighbourhood. As he stated at their last meeting, they were sinking the well at Chingford with their own workmen; and it had been done successfully and economically. They had now got down to nearly 200 feet; but they had to wait until the new pumping machinery was erected before further work could be carried on. They had no doubt as to the final results of this source of supply. There had been some little delay in starting the new engines at Walthamstow; but they hoped to have both engines and filter-beds in working order before next summer, so that they might be able to provide the Essex district during the dry months. The meeting would be interested to hear that, from the investigations and tests conducted by the Institution of Mechanical Engineers, the working of their new triple-expansion engines at Lea Bridge was demonstrated to be singularly satisfactory. A consumption of steam at the rate of 20 lbs. per indicated horse power per hour was considered an excellent performance; but in their case this recognized minimum fell to 12·50 lbs. No other engines ever tested in this country had as yet touched this remarkably low point; so that, in the sporting slang of the day, their engines at Lea Bridge had "beaten the record." They had a new triple-expansion engine at Lea Bridge in order to help their powerful Cornish engine, the "Victoria;" but the engine-house, the boiler-house, the chimney, and the coal-stores were all nearly finished and awaiting the arrival of the machinery from Hayle. They had had to put down a new main, 24 inches in diameter and 4200 yards in length, from Stoke Newington to Hackney, in order to give a better pressure at Whitechapel, Bethnal Green, and other neighbourhoods. This had been attended with most beneficial results; and they had finished it within the estimates, and within the prescribed time. The estimated cost was about £8000. During the three months of the present year, there had been rain just sufficient to fill and replenish the springs, which were so heavily drawn upon last summer and autumn. There had been a good flow of water down the Lea; and their pressure was efficient. But they would be very glad of more rain now, as during February and March the fall was deficient. There was only one frost during the past winter. It was very severe while it continued; but fortunately it only lasted one week. A frost was a most troublesome and expensive business; and an "open winter" was to them as much a subject of congratulation as it was to River Navigation and to Canal Companies. There had lately been little or no increase in the houses laid on in the Metropolitan area; the extension had all been outside this boundary—mainly in the Essex district. Last half year their new services in this outside area numbered more than 2000, which represented a town larger than Chelmsford. This newly-sprung-up community required their water; and the Company needed new capital wherewith to supply it. Referring to the absence of increase in the number of houses, and the decrease in the number of births and deaths, within the Metropolitan area, he remarked that lessened mortality might be accounted for by improved medical knowledge, by better sanitary arrangements, and, they might also say, by the goodness of the Metropolitan Water Supply. But the causes of diminished births and, presumedly, of diminished marriages, opened up an academic discussion out of place at their meeting. The main point of interest to them was that the new demands upon their supplies were all in the outer area, where, as the Chairman of the Essex County Council said in his letter to *The Times* last Tuesday," the population increases by leaps and bounds." They would be glad to hear that both the Government Analyst and the Chemical Examiners acting on behalf of the Companies reported very favourably as to the quality of the supply furnished by the East London Company. In the report made by the former official to the Registrar-General in February last, the amount of organic impurity in the East London river supply was less than that of any Company except the New River Company. Their water was also pronounced to be "efficiently filtered before delivery, and improved bacterially on the average 99 per cent.;" or, in other words, that the filtration process

removed 99 per cent. of the microbes to be found in the crude river water. In a letter from Dr. Frankland regarding the results of his chemical and bacterioscopic examinations of the London Water Supply during the last twenty months, that authority made the following very important statement "No pathogenic"—that was, dangerous—"organism has ever been found in the raw river waters before they are taken into the works of the several (Metropolitan) Companies." Dr. Frankland further said: "The number of microbes in a given volume of the raw river waters varied enormously—from 1000 to 50,000 and upwards in one cubic centimetre; but, in almost every case, the number had been satisfactorily reduced by about 99 per cent. in the subsidence and filtration operations of the Companies. Sometimes, indeed, the bacterial quality of the filtered water has equalled that of supplies from deep wells." Then, with regard to the Company's storage system, Dr. Frankland said: "Storage of the raw river water causes a great destruction of bacteria; for whilst the water at the intake of the East London Company contained, on the average of the year, 9920 microbes per cubic centimetre, the same water after storeage for fourteen days averaged only 1218 per cubic centimetre." It was for the extension of these subsiding reservoirs, for improving the quality and safeguarding the quantity of their supply, as approved of by the Royal Commission, that they were now asking for fresh capital. The other main object of their present Bill was, as already mentioned, to enable them to fulfil their legal duties in new neighbourhoods dependent upon them for their absolutely essential water supply. He was glad to state that Mr. Bryan's voyage towards the close of last year had thoroughly set him up in health. In a large concern like theirs—supplying (say) 1,250,000 people, and dependent greatly for its perfect working upon machinery—there must be anxieties and accidents from causes which could not be guarded against. When these occurred, he generally consoled himself with the thought that Mr. Bryan's skill, knowledge, and fertility of resource would carry them safely on; and this had hitherto been the case. Their Secretary, aided by an excellent staff, continued to manage his large department with tact and assiduity. At times both the legal and the parliamentary work fell heavily upon him; but Mr. Crookenden usually came out of the difficulties with credit and success. His management of their finances certainly deserved commendation, as during the last half year, out of a revenue of (say) £150,000, the bad debts amounted to only £468. Finally, as he remarked on a former occasion, there were doubtless political clouds on the horizon; but he could not help thinking that the feeling against the London Water Companies had of late undergone considerable modification. Not only was this to be gathered from the expressions of individuals, but also from the Press. He concluded by moving the adoption of the report and accounts, and the declaration of a dividend of 4 per cent., less income-tax, for the half year on the ordinary stock of the Company.

Mr. HERBERT BARNARD seconded the motion.

Mr. HANKEY inquired when they were likely to know what the fate of their application to Parliament would be with respect to their new capital.

The CHAIRMAN, in reply, stated that their Bill would come on that very afternoon; and they would therefore soon know the result. He then put the resolution; and it was carried unanimously.

On the motion of Mr. WALTER BIRD, seconded by Mr. HANKEY, the retiring Directors—Messrs. Banbury, Gadesden, and Nix—were re-elected; as was also the retiring Auditor, Mr. Bird.

The proceedings terminated in the usual manner.

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**Bexhill Water and Gas Company.**—The accounts presented at the meeting of this Company last Friday week showed a profit for the past half year of £1116, as compared with £905 in the corresponding period of 1892; and it was agreed to pay a dividend at the rate of 4 per cent. per annum.

**Fatal Gas Explosion at Manchester.**—Through looking for an escape of gas with a lighted taper last Saturday week, at Harpurhey, Manchester, Mrs. Butterworth and her daughter (aged 6 years) were seriously injured by an explosion which resulted; and shortly afterwards the child died. It appears that the escape was from a chandelier, which only contained 6 inches of water, and the inner tube of which was split for nearly 4 inches. No water, it is stated, had been put into the chandelier for three years.

**The New Water-Works for Radstock.**—Having quite recently obtained the sanction of the Local Government Board for half the proposed loan of £10,000 for water-supply purposes, after an inconvenient delay, the Radstock Local Board have not lost time in commencing this much-needed work; the ceremony of cutting the first sod having been performed by the Chairman (Mr. J. M'Murtrie) on the 27th ult. The Surveyor's report as to the feasibility of the Downhead scheme was first presented in 1892. The height of the spring is 660 feet above sea-level; and the capacity is 280,000 gallons maximum and 187,000 gallons minimum, 120,000 gallons of which are provisionally secured by lease for 75 years.

**The Price of Gas for Public Lighting Purposes at Leeds.**—On the minutes of the Gas Committee being introduced for confirmation at the meeting of the Leeds City Council last Wednesday, Alderman Spark directed the attention of the members to the fact that the Lamp Committee had asked the Gas Committee not to increase the price of gas from 2s. 2d. to 2s. 4d. to them, and that the request had not been acceded to. He was sorry so little encouragement was given to the former Committee. Mr. Pickersgill, the Chairman of the Lamp Committee, said the gas for lighting the streets cost last year £15,000; and he was afraid that next year the lamp-rate would have to be increased by a penny, for the additional cost of gas would be £1600. His Committee were doing their utmost to light the city well. Last year they put up 500 extra lamps, in addition to improving the old ones; and this year 400 had been added. They could not continue this work, however, unless they had more money; for on this last year's operations, there was a deficiency of £2400. If the price of gas was raised, the lamp-rate would have to be increased. It was decided to refer back to the Gas Committee the portion of their minutes alluding to this matter.

## METROPOLIS GAS SUPPLY.

### The Gas Referees' Revised Notification as to Candles.

We mentioned last week, when noticing the recently issued Summer Instructions of the Metropolitan Gas Referees, that certain textual changes had been made by them in their Notification as to the candles to be used for testing the illuminating power of gas, which was given in full in the JOURNAL for Dec. 19 last. The principal changes are in the paragraph (2) relating to the wicks, which now reads as follows; the insertions being printed in italics, and the omissions being placed in brackets:—

The wicks shall be made of three strands of cotton plaited together, each strand consisting of 18 threads. The strands shall be plaited with such closeness that, when the wick is laid upon a rule, and extended by a pull *of about one ounce*—just sufficient to straighten it—the number of plaits in 4 inches shall not exceed 34, nor fall short of 32. Each wick shall be of suitable length, *not less than 12 inches*, and looped ready for fixing in the mould. After having been bleached in the usual manner and thoroughly washed, the wicks shall be steeped in a liquid made by dissolving one ounce of *sal ammoniac and half an ounce* of crystallized boracic acid in a gallon of distilled water [and adding 2 ounces of liquid ammonia]. They are then to be gently wrung or pressed till most of the liquid has been removed, and dried at a moderate heat *while lying horizontally. Such a wick, cut to a length of 12 inches, when stretched as above*, shall weigh not more than [6·5] nor less than 6 grains. The weight of the ash remaining after the burning of ten wicks which have not been steeped in boracic acid, or from which the boracic acid has been washed out, shall be not more than 0·03 [0·025] grain. Wicks made in accordance with this prescription shall be sent to the office of the Gas Referees, by whom they will be examined and certified. The wicks so certified are to be used by the candle-maker in the condition in which they are returned to him. *When the wicks are set in the mould, they should be pulled with only so much force as is necessary to straighten them.*

The paragraph (3) relating to the spermaceti is unaltered; but from the succeeding one (4) the following sentence has been deleted: "As the rate of burning of a candle is affected by the force with which the wick is pulled when it is set in the mould, the strain commonly applied by an experienced maker of candles has been measured, and is found to be about 24 oz." Paragraph (5) has also been struck out; as have the Referees' reasons for prescribing the candles. As already mentioned, the two appendices—as to the method of washing the wicks and determining the melting-point of the spermaceti—are given as additional appendices (F and G) to the current Instructions.

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### The Price of Gas in the Chartered Company's Districts.

A crowded meeting of the ratepayers and inhabitants of Clerkenwell was held last Wednesday, in response to an invitation of the Vestry, in the Amwell Street School-Room, under the presidency of Mr. W. Robson, to protest against the inequalities in the charges made by The Gaslight and Coke Company in their districts north and south of the Thames. The Chairman having expatiated on the injustice of two prices—3s. 1d. per 1000 cubic feet on one side, and 2s. 5d. on the other side of the river—being charged by the Company, Mr. F. C. Frye, M.P., moved a resolution embodying a formal protest against it by the meeting. Mr. J. Rowlands, M.P., and the Hon. Massey-Mainwaring supported the motion. Mr. J. Walton expressed dissatisfaction with the terms of the resolution as it stood; and he moved an *addendum* to it, so that it should read as follows: "That this meeting of the ratepayers and inhabitants of Clerkenwell protests against consumers on the north side of the Thames being charged 3s. 1d. per 1000 feet for gas, while those on the south side are only charged 2s. 5d. per 1000 feet; and that we demand a reduction to the consumers on the north side equal to the rates charged on the south side; and, further, failing this concession, we urge on the London County Council to endeavour to obtain powers to supply gas to the whole of London." The motion, as amended, was carried unanimously. It was then decided to petition Parliament for "an inquiry into the cause of the present irregularity in the prices of gas on the north and south sides of the Thames;" and the proceedings concluded.

The question discussed at the above meeting came before several of the London local bodies last week. On Tuesday a circular received by the Shoreditch Vestry from the Secretary and General Manager of The Gaslight and Coke Company (Mr. J. W. Field), setting forth the reasons for the differences in the Company's charges, was referred to the Parliamentary Committee for consideration; and the use of the Town Hall was granted for a meeting of the ratepayers to protest against the present high price on the north of the Thames. On the following day, at the meeting of the Holborn Guardians, Mr. Howes, referring to the Company's explanatory statement, said it was not satisfactory; and he moved that the Clerk should write to the Directors and state that they had altogether missed the points raised by the Guardians. A public meeting is to be held in the Holborn Town Hall to-morrow week to discuss the subject of the price of gas. At the meeting of the St. George's, Hanover Square, Vestry last Thursday, the Clerk (Mr. J. H. Smith) read a long statement he had received from Mr. Field, setting forth the working of the sliding scale, in reply to the complaint addressed to his Company as to their charge for gas. Dissatisfaction was expressed at the reply, which was regarded as vague and evasive; and it was ordered to lie upon the table.

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**The Cost of Gas and Electric Light.**—The current number of the *Electrical Review* contains other comparisons of the cost of electric and gas lighting, which may be of interest as supplementing those quoted from the same source in last Tuesday's JOURNAL (p. 624). Inquiries were recently made regarding the cost of lighting certain parts of Woodilee Asylum by gas or electricity for the Barony Parochial Board, Glasgow. In the estimates presented, the initial cost of electric lighting was £562, against £440 for gas; and the annual cost was £98, as compared with £92 for gas. Upon these estimates being submitted, it was decided to light the asylum by gas.

## DUBLIN CORPORATION WATER SUPPLY.

### The Lough Dan Scheme Abandoned.

A Special Meeting of the Dublin Municipal Council was held on Monday last week, pursuant to a requisition which had been forwarded to the Lord Mayor by six members, who protested against the action of the Water Committee in seeking to obtain the sanction of the Local Government Board to a scheme of water-works extension which had never been submitted to, or sanctioned by, the Council. The matter, the protesting members pointed out, was urgent, as a letter had been received from the Local Government Board fixing the 4th inst. as the date of holding the inquiry.

Mr. SHANKS moved—"That the resolution of the Water-Works Committee of Jan. 26, and the subsequent action taken thereon, in presenting a petition to the Local Government Board for powers to proceed with the Lough Dan scheme, and to borrow money for the purpose, is a distinct violation of the resolution of the Council of Nov. 13 last upon the same subject." In support of his motion, he said the resolution passed on Nov. 13 last only gave the Committee authority to take the necessary preliminary steps. At the meeting on the day named, he asked if there was any authoritative statement from the City Engineer in favour of the Lough Dan scheme. The Lord Mayor's answer was that he had nothing in the way of a detailed report; but the Committee had had daily interviews with Mr. Harty, and he was cordially in favour of the scheme. At the inquiry held at Kingstown during the previous week (see *ante* p. 619), Mr. Harty stated that he reported against it, and that he was in favour of extending the Vartry supply; while Mr. Macassey stated that the advice he gave was not to make storeage works at Lough Dan, but to lay a pipe five miles long to deliver the water to the Vartry filters. He (Mr. Shanks) also happened to know that the analysts' reports regarding the quality of the water were not favourable. When so much information directly contradictory of the statement of Nov. 13 came into the possession of the Committee, it ought certainly to have been communicated to the Council With the exception of two or three members of the Committee, he had found no one who was aware of the fact that the petition had been presented to the Local Government Board. It would have been much better if the Committee had kept the Council cognizant of their actions. The result was a humiliating one. The Council were represented as petitioning for a scheme of water-works extension, and as desirous to be borrowers of £120,000 sterling for a scheme which had never been laid on the table. He felt that the course taken throughout, if not a distinct violation in terms of the resolution of the Council, was a distinct violation of the wish and will of the Council. The public interest was not safeguarded as it ought to be when it was possible for such things to happen—for two or three members of the Council, without the sanction of the Council, to take hold of large Corporation projects and manage them as they pleased. The Lord Mayor had put a notice of motion on the paper that the Lough Dan scheme should be altogether discontinued; and he was glad the requisition had brought this out.

Sir ROBERT SEXTON seconded the motion, and did so on the same grounds as those stated by Mr. Shanks.

Alderman MEADE said, as Chairman of the Water Committee, he could state that they had taken no single step beyond what they were fully instructed to take. The Committee had a great and serious difficulty to face—a water famine of almost unprecedented character; and they had spared no effort or attention to deal effectively with that great calamity. In the recommendation to acquire the rights over Lough Dan, their Borough Surveyor quite agreed. As it was found that the level was 20 feet under that of the Vartry, it was suggested, that a dam of 40 feet should be erected at the lower end of the lough, and thus the water would flow by gravitation (in the way desired) to the Vartry. Mr. Macassey reported in favour of constructing an additional reservoir in the Vartry area; and, secondly, that they should not construct the dam at the lower bed as suggested, but that a line of pipes should be made, through which the water would be delivered to the filter-beds at the lower level. Their Law Agent advised that, if the petition were to be presented, it should be done before the end of the month; and this was merely a preliminary action, and nothing, as a matter of fact, was done involving expense. As to the Lough Dan scheme being dead, the Borough Surveyor reported a few days ago that now he would not be in favour of going on with it, and so the Lord Mayor had placed his motion on the paper.

Alderman PILE said the application for the creation of an Act of Parliament to take by force people's land and to launch the city into an expenditure of £120,000, could not be called a preliminary proceeding. It would be more manly for the members of the Committee concerned in this scheme to fairly admit the errors they had made.

Mr. CLANCY said his recollection of Mr. Harty's consultation, in an informal manner, on Nov. 13, was that he quite agreed it would be a good and efficient scheme; but while he (Mr. Clancy) was in favour of any scheme within reasonable bounds for enlarging the city water supply, he would not be a party to any Committee rushing an expenditure through without having it fully threshed out.

The HIGH SHERIFF thought credit was due to Mr. Shanks for his timely action. It seemed to him that there was a section of the Corporation who did not wish anybody to have hand, act, or part in any movement but themselves.

The LORD MAYOR denied that the Water Committee stood there that day in a ridiculous position. At a time when it was necessary to take active steps to provide an additional supply of water, the whole Council took the responsibility of directing certain proceedings to be taken, and entrusted these proceedings to the Water Committee. The Committee had legally carried out the direction; and it was perfectly known to the eleven members that it was not the intention to proceed further with the project until they laid the whole matter before the Council, if they proceeded with it at all. On July 26 every member of the Committee, including Mr. Shanks, had perfect access to Mr. Macassey's report, whose advice was not to go on with the scheme in the way proposed. As to the merits or demerits of the scheme, he did not think he should enter into them now. He and all the members of the Committee some time ago made up their minds that they would advise the Council not to proceed with the scheme as it was originally submitted. It was said Mr. Harty advised against the Lough Dan project. Up to the time that he and Mr. Macassey went further into the matter, Mr. Harty was largely in favour of the scheme. He modified his views then; and he (the Lord Mayor) concurred with him.

Mr. J. REILLY moved an amendment to the effect that the Water Committee be hereby directed not to proceed with the scheme for obtaining a supply of water from Lough Dan.

A few other members spoke for and against the motion; and eventually the amendment was carried unanimously.

## THE NEWCASTLE AND GATESHEAD WATER COMPANY'S BILL.

### The Supply of Water to North Shields.

At the Meeting of the Newcastle City Council last Wednesday, the Parliamentary Committee presented a further report dealing with the Bill of the local Water Company. It stated that the Committee had again considered the question of the protection of the Corporation with regard to the supply of water in bulk by the Company to the North Shields Water Company under the Newcastle Company's Acts, which provided that such a supply might be afforded only so long as there was in the reservoirs 500 million gallons of water between May 1 and Sept. 30. The Council had determined that this standard of sufficiency of water in store before any supply was furnished to the North Shields Company ought to be largely increased, be applicable at all periods of the year, and be exclusive of Tyne water. The Committee, having had communications with the Newcastle Company, and having regard to the desirability of avoiding, if possible, a parliamentary contest with the North Shields Corporation, recommended the Council to agree to the insertion in the Bill of a clause providing that, whenever, after the Newcastle Company had obtained a supply of water from the River Rede, there should at any period of the year be in their reservoirs less than 800 million gallons, and more than 700 million gallons of water, exclusive of Tyne water, they might supply the North Shields Company with not exceeding 600,000 gallons per day; when less than 700 million gallons and more than 600 million gallons in store, not exceeding 500,000 gallons a day; when less than 600 million gallons and more than 500 million gallons, not exceeding 400,000 gallons a day; and whenever there was at any period of the year less than 500 million gallons of water in store, exclusive of Tyne water, no supply should be afforded to North Shields. It was proposed that this provision should be subject to the obligation of the Newcastle Company under an agreement entered into between them and the North Shields Company in 1886, by which the former agreed to supply the latter for 21 years from March, 1887, with 440,000 gallons a day; but whenever there was less than 800 and more than 700 million gallons of water in the reservoirs, they were not obliged to supply more than 340,000 gallons a day; when less than 700 and more than 600 million gallons, not more than 240,000 gallons a day; when less than 600 and more than 500 million gallons, not more than 140,000 gallons a day; and when there was less than 500 million gallons, there was no liability on the part of the Newcastle Company to supply any water to North Shields. After the adoption of the report had been moved by Alderman C. F. Hamond, Alderman Richardson remarked that if the Company accepted the proposals of the Corporation, the arrangement would be more than fair to the Newcastle people. The first business of the Corporation was to protect the citizens; and when they had succeeded in doing this, they ought not to be churlish or selfish in dealing with the adjoining population. When once the Rede connection was effected, there would be an ample supply for Newcastle for all time. If the Water Company agreed to the terms set forth in the proposals of the Committee, the Council ought to give the Company their loyal support in Parliament; for they were going to have a stiff fight with the landowners. Alderman Hamond intimated that he had reason to believe the Company would agree to the Committee's recommendations; and the report was passed by 15 votes to 13.

**Newcastle-under-Lyme Gas Accounts.**—The abstract of accounts of the Newcastle-under-Lyme Corporation for the municipal year ending on the 31st ult. has been issued; and it shows that the gross profit on the revenue account of the Gas Department was £4649, as against £4607 for the previous twelve months.

**The Lighting of Bradford Out-townships.**—The Gas Committee of the Bradford Corporation, after carefully considering the matter, have decided to take steps with the view of relieving the out-townships within the borough of the anomalous position in which they have stood in having to draw their gas supply from local Companies at a price considerably greater than that charged by the Committee for the supply of the rest of the borough. At the last meeting of the Committee, a Sub-Committee was appointed "to consider the best means of placing the townships of Heaton and Allerton and the hamlets of Thornbury and Tyersal on equal terms with the rest of the borough in reference to lighting."

**Serious Outlook for the Leicester Corporation Water Committee.**—Alderman Wood informed the members of the Leicester Town Council last Tuesday that the position in regard to the water supply was unfortunately not a good one for the time of the year. They had 357 million gallons of water in stock, compared with 800 million gallons at that time last year; showing a deficiency of 532 million gallons. A most serious aspect was the rapid rate at which the reservoirs were now receding. They had lost 11 million gallons during the last five days. The total inflow, including the Ellistown supply, had been only 1½ million gallons; and the toal consumption, 12½ millions. They were proceeding with the laying of mains from Swithland to Bradgate, and in about five weeks they would be in a position to send water down to Bradgate; but if the drought continued, that brook would also run dry. If they had a dry summer, the position would become critical, and would need all possible economy to save the town from a great danger.

## CHECKING WASTE OF WATER WITHOUT METERS.

In the JOURNAL for the 20th ult. (p. 536), we gave an abstract of a paper on "The Prevention and Detection of Waste of Water," read by Mr. E. Collins, M.Inst.C.E., at the Institution of Civil Engineers. As one of the engineering staff of the New River Company, the author had supervised the introduction of waste-meters in a district at the East-end; and he advocated the system, and described in detail the plan he adopted for its efficient working. In the course of the discussion on the paper, Mr. F. Griffith, M.Inst.C.E., Resident Engineer and Manager of the Leicester Corporation Water-Works, made some remarks which showed that the plan adopted in that town for preventing waste without the use of meters furnishes better results than those found in many towns where these appliances have been introduced at a considerable outlay. Not in Leicester only, but in many of the Midland towns, has the question of reducing the waste of water to a minimum forced itself upon the attention of the Borough Engineers. Especially has this been the case at Leicester, in consequence of the rapid increase in the number of water consumers and the diminished rainfall in recent years. In that town, the consumption of water for all purposes, including waste for a constant supply, has been reduced to 17·36 gallons per head per day; and for the final quarter of the past year it was only 12·31 gallons, owing to a limited supply. Mr. Griffith gave the following description of the simple method adopted for tracing waste water to defective services and fittings above and below ground. The area within the limits of supply is divided into 331 districts; each being controlled by a stop-valve, which during night inspection is closed and opened slowly. During this operation, the flow of water is heard by the aid of the stethoscope. The amount of waste on the district under inspection is gauged according to the number of revolutions by which the valve is opened when the sound of water is heard to be flowing through. If there is no sound, there is no waste. Where water is flowing through valves at more than a quarter of a revolution, the result is booked, and referred to the day inspector, who follows the report of the night inspector, and traces the waste until found by sounding and inspecting the various fittings and services in the district. The sound increases as the point where waste exists is approached, and is eventually found and repaired. Mr. Griffith showed samples of defective lead services found underground by these means; and he stated that as many as three fractured service mains had been detected in one night's inspection. The water population of Leicester is 203,035 persons. There are 40,607 houses, and 26,704 water-closets. The use of syphon cisterns, as well as double-valve cisterns to give a 2-gallon flush, are permitted, if equal to the specification and to the sample exhibited in the testing-room. A test by meter on water-closets where syphon cisterns were used, as against double-valve cisterns, showed a result in favour of the syphon cistern; and a similar test by meter between the self-closing tap and the screw-down tap showed a result in favour of the self-closing tap. Meters are changed, tested, and repaired every three years; the results being entered in a book stating the cost of the meter, the date of purchase, and the cost of repairs. The whole of the fittings within the limit of supply are periodically surveyed; and the result is entered in the fittings register. The staff of waste inspectors consists of one chief inspector and six sub-inspectors, who devote their whole time to detecting waste and re-washering taps. The number of reports attended to in 1893 was 17,744, consisting of burst service-pipes, closet-fittings, and tap repairs. Mr. Griffith remarked, in conclusion, that, though waste-water meters are in use in connection with many water-works undertakings, they cannot, without the aid of a staff of waste inspectors, be worked successfully; whereas the case of Leicester proved that, with efficient and intelligent inspection, such meters are unnecessary for detecting waste. The system by which the water supply in that town is controlled was on several occasions referred to by the late Mr. Thomas Hawksley; the last being in the course of his evidence before the Royal Commission on the Metropolitan Water Supply.

## KIMBERLEY WATER-WORKS COMPANY, LIMITED.

### The De Beers Company and the Undertaking.

The Annual General Meeting of this Company was held last Wednesday, at the Cannon Street Hotel, E.C.—Mr. A. J. MACDONALD in the chair.

The report and accounts (which were noticed in last week's JOURNAL) having been presented,

The CHAIRMAN, in moving the adoption of the report and accounts, and the declaration of a dividend at the rate of 5 per cent., said it was extremely regrettable to have to report a further decrease in the business, arising from circumstances over which the Directors could have had no control whatever. Everything in the direction of economical working consistent with efficiency had been carried out at home and in the Colony. The circumstances against the Company had been the entire stoppage for the time being of the mines at Dutoitspan and Bultfontein, and a further economy on the part of the mines still at work in the use of the Vaal River water. There was also a slight increase in the rainfall, as compared with 1892; but this would not appreciably affect the consumption. Under the instructions of the Board, the Manager had issued a circular to the consumers to the effect that no discount would be allowed after April 30. This course had been taken owing to the sudden fall in the demand from the mines, and the reduction brought about by the passing of the De Beers Consolidated Mines Water Bill. The great decrease in the consumption during January and February of the present year was caused mainly by the abnormal rainfall—no less than 12·663 inches falling in 25 days. The average monthly rainfall in 1893 was 1·17 inches; so that it would be seen that the Company's troubles at the beginning of the year were chiefly attributable to the elements. With regard to the accounts, there had been a decrease in the expenditure from £24,573 to £23,955. There had, however, been one or two items in which there were increases. The charges for pumping had advanced by nearly £600; but this was explained by the Manager as having been caused by his having consumed out of stock 180 tons of Welsh coal, and also by his having reduced the value of the coal in stock. Under the head of maintenance, there was an increase of £247. This extra expenditure was for necessary repairs to the intake at the Vaal River, and the clearing out of the filter-beds and the renewal of the filtering medium. The balance-sheet showed that the Company were in a satisfactory financial position. They owed nothing but what was covered by monies outstanding on customers' accounts; and they were in possession of cash to meet the dividend.

Mr. J. JACKSON, in seconding the motion, said the most sanguine shareholder in the Company could not but admit that the circumstances and times under which they met were somewhat critical. When they assembled last year, they were confronted with a large decrease in the consumption of water, which they met by cutting down expenditure; and during the year there was no further decrease in consumption worth speaking of. Since then there had been a copious rainfall; and the decrease in the consumption in the early part of this year was not only accounted for by this, but by the De Beers Company economizing as far as they could in the use of the Company's water. The Directors would naturally not attempt to force on any conflict with the De Beers Company, unless it was absolutely necessary; but it seemed to him that, unless the agreement with them was carried out, they would be obliged to take every means in their power to maintain their rights. As to the dividend, it must be patent to the most casual observer that, if the consumption remained at the present low figure, it would be impossible for the Company to pay 5 per cent.; but it was not at all likely to continue so low as in January and February.

Mr. WAKEFIELD inquired if it would not be well for the Directors to come to some arrangement with the De Beers Company to purchase the undertaking, seeing they were the largest consumers of water.

The CHAIRMAN replied that, as far as the Directors were concerned, they would be glad to get a fair offer for the works from the De Beers Company. It was quite possible an offer might be made shortly. According to the Company's agreement, they had first to offer the works to the Kimberley Borough Council; but he did not think that body were in a position to purchase. The Directors would then be able to offer the works to the De Beers Company.

A SHAREHOLDER urged the Directors not to neglect any opportunity of negotiating with the De Beers Company upon a fair and reasonable basis; while another gentleman expressed the hope that the Board would not be frightened into giving the property away to them.

Considerable discussion ensued on certain items in the accounts, after which the motion was carried unanimously.

The retiring members of the Board (Messrs. A. J. Macdonald and G. F. Smith) and the Auditors were re-elected; and a vote of thanks to the Directors concluded the proceedings.

**The Electric Light Question at Folkestone.**—Last Friday, the Folkestone Corporation, after a sitting extending over four hours—the last of several meetings on the subject—approved of a scheme of electric lighting, at a cost of £35,000. There was considerable opposition; and several members of the Corporation who are shareholders in the Gas Company were not allowed to vote on the question.

**The Gas Workers' Strike in Vienna.**—The strike of gas workers in Vienna has had a disastrous termination for the men, as was generally thought would be the case. The officials of the Imperial Continental Gas Association obtained all the hands they required; and on Tuesday last all the stations were working at their full power. We believe only about 120 of the strikers are to be reinstated.

**Gas-Works Extensions at Sowerby Bridge.**—The Sowerby Bridge Local Board have received an intimation from the Local Government Board sanctioning the enlargement of their borrowing powers for gas purposes by £20,000. Regarding the extension of their gas-mains to Luddenden, the Local Government Board point out that a similar application was refused in 1889, and ask to be informed whether there has been any alteration in the circumstances since that date. They further desire to know whether the Local Board have obtained any pledges from millowners to take the gas, supposing the mains were extended.

**The Littlehampton Gas Company Fined.**—The Arundel County Magistrates had before them, yesterday week, an action brought by the Littlehampton Local Board against the Gas Company for supplying, on Feb. 21 last, gas of an illuminating power lower than the standard of 15 sperm candles provided for in their Special Act of 1888. Evidence was given by Mr. W. C. Young that three tests which he made on the day in question showed that the gas had an illuminating power of only 13·7 candles. On behalf of the Company, it was stated that they had experienced great difficulties since the removal of their works; that they had done everything in their power to provide good gas; and that, according to tests made by the Manager (Mr. W. Waite) on Feb. 21, the illuminating power was 15·24 candles. The Bench, however, were satisfied with Mr. Young's evidence, and fined the Company £5, and costs amounting to £4 16s.

**Exhibitions of Gas Appliances.**—From Tuesday to Friday last week, Messrs. Fletcher, Russell, and Co., Limited, held an exhibition of their gas ranges, fires, and other appliances in the Parochial Hall, Knowle, Bristol; and in conjunction therewith, Madame Alting-Mees delivered free lectures on cooking by gas. Under the auspices of the Gas Committee of the Doncaster Corporation, the same firm opened an exhibition of gas appliances at the Guildhall in that town last Tuesday; demonstrations in cookery being given by Mrs. Young. ——The Davis Gas-Stove Company, Limited, held last week exhibitions of gas appliances at Cheshunt and Stroud; Mrs. Ellen Hunter giving cookery lectures at the latter, and Mrs. Springthorpe at the former place.——At the Hulme Town Hall, Manchester, last Tuesday, Messrs. Richmond and Co., Limited, opened a gas exhibition, which will continue till Friday next. Miss Owen's lectures on cookery, in conjunction therewith, are proving attractive.——At the Liberal Club, Accrington, last week, there was an exhibition of the "Main" gas appliances, with lectures by Miss Parker.

## NOTES FROM SCOTLAND.

**From Our Own Correspondent.**

*Saturday.*

On account, I should say, of the absence of a reasonable mode of negotiating, it is now all but certain that there will be a contest in Parliament over the Falkirk Gas Bills, both of which have been read a second time in the House of Lords, and will soon be before a Committee of that House. Petitions against both have been presented. In the petition by the Corporation against the Bill of the Joint-Stock Gas Company, it is set forth that, so long as two Gas Companies existed in the burgh, there was competition between them, and the price of gas was 3s. 2d. per 1000 cubic feet, but that after they amalgamated in 1888, the price of gas was raised until, in 1891, it was 4s. 2d. per 1000 cubic feet, at which it now remains; that, whereas the Company assert that they have expended a capital of £50,000, they have only expended £36,438—the balance consisting of sums added to the shares out of profits, by the process of "watering;" that the works and plant of the Company are insufficient, and are worn out—the leakage of gas amounting to from 19 to 25 per cent.; that excessive charges have been made by the Company for gas consumed in the public lamps; and that the proposed capital of £90,000 which the Company seek to establish is extravagant—the Corporation being satisfied that they could provide suitable gas-works for a capital expenditure of greatly less than £50,000. Objection is also taken to the fixing of the standard price of gas at 4s. 5d. per 1000 cubic feet, as excessive in the circumstances; Falkirk being exceptionally well situated, in the matter of proximity to the coal-fields and of facilities for carriage by land and water, for the production of gas at a cheap rate. The Joint-Stock Gas Company, in their petition against the Corporation measure, assert that the Corporation are endeavouring, contrary to the provisions of the Burghs Gas Supply (Scotland) Act, 1876, without seeking power to acquire the undertaking of the Company, to obtain powers to compete with them, by proposing to erect gas-works at a cost not exceeding £120,000; that the result would in effect be a confiscation of the Company's property; that no public necessity exists for interference with them; and that the power which the Corporation propose to take, of imposing an unlimited guarantee rate, would act prejudicially upon the Company, who are large ratepayers in the burgh. Petitions against the Corporation Bill are also presented by ratepayers in Falkirk, who state that they have been satisfied with the service of the Gas Company, and that management of the gas undertaking by the Corporation would not be so economical and successful as by the Company; and also by ratepayers in the area outside the burgh, who complain that, if the Corporation Bill were passed, they would be deprived of all voice or control in connection with the gas supply, and would be at the mercy of the Corporation in the matter of price. These are all the customary block-pattern statements which are to be met with in petitions, through all of which a Parliamentary Committee may be relied upon to see how the land lies. It is one of the privileges of living under the British Constitution—commonly called the abuse of Private Bill Legislation—that, if parties are prepared to pay for it, they may have their palaver before a Parliamentary Committee, and then come to terms. That is what will take place in this case. If the Corporation are really desirous of taking over the Company's undertaking, they will be allowed to do it on fair terms; but if they are not prepared to offer terms which are fair, then they must stand aside and let the Company get their Bill. That is an elementary principle which should not be difficult to grasp; and yet the Corporation do not seem able to realize it. It will be quite plain to them after the contest is over; but then their money will have been spent. The man with a headache and empty pockets is always of opinion that he ought not to have gone to the fair yesterday.

It is reported from Dundee—and I understand that the experience is not a unique one—that the consumption of gas for the current year will be found to be considerably less than last year. The reason given is one which is quite easily reconciled with actual experience. During the past winter, many mills were running on short time; and employers, as a matter of course, preferred to run their works during the hours of daylight. In Dundee, it is reported that, at the end of February, the decrease was somewhere about 28 million cubic feet, as compared with the previous year. The revenue from the sale of gas is expected to suffer by between £2000 and £3000; but as good prices have been realized for residual products, it is expected that the gross revenue will only be down about £1000. Other manufacturing towns are similarly situated.

At the monthly meeting of the Dundee Gas Commission, on Wednesday, an application was made for a supply of gas to residences at Wormit, at the south end of the Tay Bridge. Already the Dundee Water Commissioners have a main which crosses the Tay by means of the Tay Bridge, and supplies the towns of Newport and Tayport. It will be somewhat of a new experience to have gas conveyed across an estuary of the sea for two miles, in a pipe which must necessarily be exposed more than ordinarily to vicissitudes of temperature. If the proposal be carried out, it will be a severe test of Dundee gas; and the consumers will require not to be, at all times, too particular as to the illuminating power. The Commission looked favourably upon the application; regarding it in this light—that they would be prepared to sell gas in bulk to the inhabitants of Wormit, provided they arranged for carrying it across. The subject was sent to the Works Committee.

The reference as to the cost of excavating for the new gasholder tank at Inverness has been disposed of by the Arbitrator (Mr. Murdoch Paterson, C.E., of Inverness). The contractor (Mr. R. Fraser, of Inverness) claimed £1179 for extra work, less £313 of an unpaid balance. The latter sum has, of course, been sustained; and the Arbitrator has allowed £283 out of the balance of £865. Messrs. Newton, Chambers, and Co., of Sheffield, the contractors for the construction of the gasholder, were allowed £160 for extra work in connection with their contract. This makes a total sum of £443 allowed for extra work upon the tank and holder under contracts which together amounted to £7293. That is a very moderate sum; and reflects credit upon Mr. J. Thomson, the Manager of the gas-works, for the care with which he prepared the specifications.

A deputation from the Helensburgh Gas Company, including Mr. W. Smith, the Manager, visited Perth on Monday, for the purpose of seeing the oil-gas plant. Mr. T. Whimster, the Manager of the Perth works, and Mr. Rollo, the Assistant-Manager, showed them the whole of the process at work; and the visitors left highly pleased. Perth, as containing the largest oil-gas plant in Scotland, has now become the centre for all inquiring bodies.

The Newton-on-Ayr Gas Company, which is managed by Mr. J. Henderson, have made the following reductions in the price of gas: In Newton and Wallacetown, from 4s. 2d. to 3s. 9d.; in Prestwick, from 5s. to 4s. 2d.; and in Monkton, from 5s. to 4s. 7d. per 1000 feet.

Sulphate of ammonia is reported to be easier in price, and to be selling at from £13 17s. 6d. to £14 per ton. Few transactions are taking place; most of the output being contracted for ahead. One company is said to be making the boast that it has not sold any under the maximum price of £14 5s. per ton.

In Coatbridge last Saturday, there was inaugurated an electric lighting installation, which, if the newspaper description of it be correct, well merits the remark of Lord Kelvin, the principal speaker at the inaugural ceremony, that it "might be found to have an interest to the whole civilized world in both hemispheres." One of the leading Scotch newspapers says that "the current is distributed on the low-tension alternating system; the mains being fed from transformers fixed in underground chambers in convenient parts of the town." Of course, the reporter has put his communicated description the reverse way to that in which he got it; but his inability, which is quite apparent, to understand what he was writing about did not detract from the appreciation with which he viewed the new venture. It was not, however, of the electrical plant that Lord Kelvin was speaking when he uttered the remark given above; it was of a feature of the installation which makes it unique—viz., the employment of gas for the generation of energy. The gas used is described with a good deal of euphuism as carbon monoxide. It would never have done to have called it "the deadly carbonic oxide." There are two gas-producers, each being capable of generating gas for 120 brake horse power; the gas plant and engines being the work of Messrs. Dick, Kerr, and Co. The installation has been fitted up by the Brush Electrical Engineering Company, for the Scottish House-to-House Electricity Company, who hold the Provisional Order for the town. According to Lord Kelvin, this is the first installation which fulfils the aspirations of the late Sir William Siemens and others, in the employment of a cheap non-illuminating gas as the source of energy. Lord Kelvin was jubilant over the fact that the aspirations of their great teachers had been realized; and he thought the Company were to be congratulated on the bold, courageous step they had taken. Well, his Lordship was right in describing it as a bold, courageous step, because the fact is that, if electricity can be made to pay in Coatbridge, it should be possible to make it pay anywhere. The town lies in the centre of a coal-producing district, where there is every facility for manufacturing and supplying gas at a cheap rate, and for the disposal of all residuals. It was therefore not a choice on the part of the Scottish House-to-House Company, but a necessity, if they were to find room for existence in Coatbridge, that they should adopt the very cheapest method of producing electricity. The installation may, consequently, more than any other yet in existence, be looked upon as a throwing down of the gauntlet to the gas-supplying body.

Another swing of the pendulum has taken place in Stirling, in connection with the matter of the introduction of electric lighting. Last week I recorded that the Town Council had resolved to oppose the application of the Caledonian Electric Supply Company for a Provisional Order empowering them to supply the town with electricity. Events have developed suddenly this week. The Council met, and resolved that, along with their memorial to the Board of Trade, they should forward a statement to the effect that, if the Company's application were refused, and they had another opportunity given them of applying for a Provisional Order, they would do so. This was signed by all the members of the Council except three; and yesterday a telegram was received in Stirling from the Parliamentary Agents of the Council, stating that the Board of Trade had refused the application of the Caledonian Company. The Council are now committed to make application on their own behalf, which, of course, will be granted. They have, in a sense, out-generalled the Caledonian Company; but, on the other hand, the promoters of the Company have the satisfaction of seeing the Council driven to take the subject up, which was possibly all they wanted.

The town of Girvan, in Ayrshire, has just had its water supply augmented by the addition of 6 million gallons to its reservoir capacity, which is double the amount previously existing. There is now a supply equal to 30 gallons per head per day for six months. The original water-works, opened in 1883, cost £9200; and the present addition necessitated an outlay of £2300.

The Falkirk and Larbert Water Trustees have let the contract for the reconstruction of the embankment of Earl's Burn reservoir, which has been faulty since its erection, to Messrs. Stark and Son, whose tender for the work was £3368. The highest offer was £5601.

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**A Failure of the Electric Light in the City.**—At the meeting of the Commission of Sewers last Tuesday, Mr. B. Turner called attention to a serious failure which had occurred in the electric light. Mr. Ross (Assistant-Engineer) stated that he had received a report from the Electric Lighting Company to the effect that the accident was due to a damaged and defective cable, which, however, was speedily repaired. Mr. Turner said he hoped the Engineer would impress upon the Company the necessity for preventing, if possible, such failures in the future.

**The Danger of the Proximity of Electric Light Wires to Gas-Mains.**—A Reuter's despatch from Paris says: "Great alarm was occasioned at Nantes, at half-past eight last Wednesday night, by several loud reports, followed by the sudden upheaval of the pavement, in the Place du Pilori, for a distance of upwards of 40 yards. Three pedestrians were injured—one rather seriously. An investigation showed that a serious explosion had occurred in the electric light and gas main; and it is believed that it was caused by an electric wire coming in contact with a gas-pipe."

## CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April 7.*

**Sulphate of Ammonia.**—Prices have given way a little, as the absence of foreign orders leaves the field entirely to the speculators. Quotations have been made down to £13 10s. But as there are more buyers appearing at these lower figures, it may be assumed that the downward tendency is already checked; the more so as the stiff advance in nitrate (now 10s. 7½d. per cwt.) has considerably reduced the somewhat large difference between the two fertilizers. High prices have evidently checked the consumption in some quarters. But the fine weather has militated against any increase in the production; and the stocks are therefore not heavy. It is apparently not generally expected that a low level of values will eventually supervene, as there are forward buyers over next winter at £13 10s.; and the summer requirements are likely to be heavy.

LONDON, *April 7.*

**Tar Products.**—There is a little more inquiry for benzols, particularly 50's, though 90's are more saleable than they have been for some time. Carbolic acid is steady; and the market is slightly better for cresylic. Creosote and common oils are moving off a little more freely; but makers hold heavy stocks, and the price is distinctly weak. Solvent naphtha is in good request; and anthracene is firm at the Committee's price. The following prices have been paid for business during the week: Tar, 12s. 6d. to 16s. 6d. Pitch, 26s. to 27s. 6d. Benzols, 90's, 1s. 2d.; 50's, 1s. 5d. Creosote, 1¼d. Creosote salts, 25s. Solvent naphtha, 1s. 2d. Toluol, 1s. 7d. Cresol, 1s. Crude benzol naphtha, 30 per cent., 6d. Carbolic acid, 60's, 1s. 8d. Anthracene, 30 per cent., "A," 1s. 1d.; "B," 10d.

**Sulphate of Ammonia.**—A determined effort to depress the price of sulphate is being made. There is not the slightest reason for the value being lower, especially as nitrate of soda is firmer than it has been for a long time; and the price has advanced, and is still advancing. Moreover, makers of sulphate are well sold, and not one holds any stock. Notwithstanding all this, the market quotation to-day ranges from £13 10s. to £13 15s., less 3½ per cent., according to position and conditions of delivery; while gas liquor is worth 10s. to 12s. 6d. per ton.

## COAL TRADE REPORTS.

**From Our Own Correspondents.**

**Lancashire Coal Trade.**—The downward movement in prices throughout this district, so far as all descriptions of round coal are concerned, continues; and since the commencement of the month, it has been quite 6d. to 1s. per ton upon previous quoted rates. The decision of the leading Manchester colliery firms, referred to last week, to only reduce 5d. per ton on house-fire coals in the Manchester district, was of a very temporary character, as it was found that reductions in other districts were being made, that would still further increase the keenness of competition with local supplies; and before the revised rates had been put in force another meeting was held, when it was decided to make a general reduction of 10d. per ton upon house-coals throughout Manchester and Salford. The reduction in prices generally adopted by the Lancashire Coal Sales' Association are officially about 6d. per ton upon last month's rates; but some of the leading colliery firms that are not connected with the Association have reduced their quotations 1s. per ton. Prices generally are very irregular; whilst the excessive keenness of competition in the open market is rendering it very difficult to keep the members of the Association together. At a special meeting of the Association held in Manchester on Tuesday last, it was announced that one of the largest firms in the Wigan district had seceded from the Association; but at the same time several smaller collieries which have previously stood aloof had joined, so that the strength of the Association was in no way appreciably affected. The secession, however, of a very large colliery concern is significant of the difficulty which exists in securing an effective combination among coalowners for holding up prices; and the opinion very generally expressed in the trade is that the Lancashire Coal Sales' Association is on anything but such a strong basis as to guarantee its very long-continued existence. For all descriptions of round coal, the demand is extremely slow; and although many of the collieries throughout West Lancashire are not working more than three days per week, and four days represent the full average, stocks are rapidly accumulating, both on the pit banks and under load on the pit-sidings. In special cases, 12s. to 12s. 6d. is still quoted for the very best Wigan Arley coals at the pit mouth; but the general run of prices is more nearly 11s. to 11s. 6d. Pemberton four-feet and seconds Arley are about 10s. to 10s. 6d.; common house-coals, 8s. 6d. to 9s.; and the lower qualities, suitable for steam and general manufacturing purposes, 7s. 6d. to 8s. per ton at the pit. In the shipping trade, business continues extremely small; and there has been a further reduction upon even the previous low prices—8s. 6d. to 9s. being the average for ordinary descriptions of steam coal, with better qualities ranging from 9s. 6d. to 10s. per ton, delivered at the ports on the Mersey. The very limited production of slack causes scarcity of engine fuel in the market; but except that prices are firm at full late rates, any appreciable advance is scarcely possible, owing to the excessively low prices at which inferior descriptions of round coal can now be bought. At the pit mouth, common sorts of slack average 5s. to 5s. 6d.; the best sorts, 6s. 6d. to 7s.; and burgy, about 8s. per ton.

**Northern Coal Trade.**—There is only a languid demand for coal in the North of England, because the home consumption has fallen off, and the foreign demand is still limited. There is, in consequence, the working of short time at some of the collieries, especially of those producing gas coals. There have, however, been some of the season's orders placed of late; and certain of these are being pretty freely shipped, as merchants desire to take advantage of the very low current rates of steamship freights. Best Northumbrian steam coals are steady in price; and the fact that the great Russian naval contract has been allotted at prices that are believed to leave 9s. 9d. to 9s. 10d. per ton f.o.b. for the coals, has stiffened the market—more especially as it is thought that that portion of the order which last year was given to France has this year returned to the North of England. Second-class steam coals are about 9s. to 9s. 9d. per ton f.o.b.; and small steam are firm at from 4s. 3d. to 4s. 9d. per ton, according to the quality and the position of the pit. In regard to gas coals, it may be said that the combination maintains its price, though some collieries cannot obtain trade enough to keep their pits at work full time; and this difficulty must get worse, as the minimum demand is shown in the next two months or so. The prices quoted for best Durham gas coals by the associated collieries are from 7s. 3d. to 7s. 9d. In a few instances, the unassociated collieries will take a little lower price; whilst in one, as high as 8s. 3d. per ton is asked. Manufacturing coals are quiet. Coke is still dull, as far as the export demand is concerned, the price being 13s. 6d. to 14s. f.o.b.; but there is a larger inquiry for coke for local blast furnaces. There is no alteration in the position or prospects of gas coke this week.

**Scotch Coal Trade.**—The market is, if anything, steadier, which is probably the effect of the collapse of the four days a week policy; sellers being now at more freedom in accepting, and purchasers in giving, forward orders. Steam coal is in least demand. For other varieties, there is a better inquiry; ell continuing to hold the first place. Prices have varied but little. The quotations are: Main, 7s.; ell, 8s. to 8s. 6d.; splint, 8s. to 8s. 3d.; and steam, 9s. 3d. to 9s. 6d. The shipments are improving. For the week, the total was 150,594 tons—an increase of 9767 tons upon the preceding week, and of 6243 tons upon the corresponding week of last year. For the year to date, the total shipments have been 6,177,140 tons—an increase over the same period of last year of 295,716 tons.

**The Dangers of Gas-Baths.**—Last Wednesday, Mr. S. F. Langham held an inquest at the Redemptorist Fathers' Monastery, Clapham Park Road, in connection with the death of Father Alfred Egan, aged 36, which occurred in the monastery on Monday. Deceased was last seen alive on the previous Monday morning, about a quarter to eleven o'clock. Later on an alarm was raised that he was missing; and he was found lying on his left side on the bath-room floor. The door of the room was fastened on the inside, and when it was burst open the place was found to be full of gas, which had escaped from the geyser. There were indications that the bath had been recently used. Dr. Mahony stated that death was due to suffocation by gas; and deceased in all probability fell while dressing. The Coroner, in summing up, said there was nothing in the evidence to suggest that the deceased had committed suicide. The jury returned a verdict of "Accidental death."

**Interruption of the Gas Supply of Selby.**—On the nights of the 30th and 31st ult., considerable interruption took place in the supply of gas to Selby. The first intimation of anything being wrong occurred at about half-past seven on the evening of the first-named day, when a number of the lights in the town were extinguished for about 20 minutes. A similar accident happened on the following evening; but it was of longer duration. However, lighting was restored about nine o'clock. As to the cause of the trouble, it may be remembered that during the floods of October, 1892, the gas-works were under water, and the supply of gas to the town was cut off. It was now supposed that some of the pipes might have subsided, and thus caused the defective supply. The Manager (Mr. J. S. Naylor) examined the mains, and found leakages in several places. The pipes were really standing in water. The failure was no doubt due to their subsiding, and water accumulating under the railway lines, over which during the past twelve months there has been a considerable amount of traffic No blame is attributable to Mr. Naylor, who telegraphed for Mr. Sellers, of York; and that gentleman being away, his assistant went over to Selby to aid in the investigation of the matter.

**The Torquay Corporation and the Gas Company's Bill.**—At the meeting of the Torquay Town Council last Tuesday, the Finance Committee, to whom in January last was referred for consideration the Bill of the Torquay Gas Company, reported that the Company had agreed to reduce the maximum price of gas from 5s. 6d. to 5s. per 1000 cubic feet, but that they could not see their way to acceding to the proposal to increase the illuminating power. The Committee recommended that this point should not be pressed. The Company had agreed to the establishment of a testing-place at the Company's office; but they had declined to include in their Bill a permissive clause for the sale of the works to the Corporation. They would, however, consider a satisfactory offer; but it must be distinctly understood that they had no desire to sell. The Committee suggested that further negotiations should be entered into with the Company, with a view of obtaining the establishment of the testing-place at the Town Hall, and that the Borough Solicitor and the Parliamentary Agents should be instructed to see that clauses giving effect to the above and any further concessions which might be received, should be inserted in the Bill. The report was adopted

**West's Stoking Machinery at the Halifax Gas-Works.**—Among the items for payment submitted by the Gas Committee at last Wednesday's meeting of the Halifax Town Council was one of £250, on account, for stoking machinery supplied by West's Gas Improvement Company, Limited. Alderman Whitaker moved that the item be deleted, and also that a Committee be appointed to inquire into the management of the gas-works. He urged that there was much dissatisfaction with regard to the stoking machinery. Mr. Rushworth seconded the amendment; and Mr. Arnold, in supporting it, said the entire cost of the stoking machinery was said to be about £7000. In justice to the ratepayers, he thought an inquiry ought to be made with regard to this outlay. Mr. Beever protested against the stoking machinery being considered a failure, although he was not quite satisfied with its working at Halifax. He denied that the machinery had cost £7000; and instead of fostering ill-feeling outside the Council by asking pernicious questions, he felt it would be much better if members of the Council accorded to the Gas Committee their sympathy and confidence. It was pointed out by Alderman Brook, the Chairman of the Gas Committee, that these stoking-machines were in successful operation at a number of works in the country. The amendment was rejected; and the minutes were confirmed.

**An Unprofitable Year for the New Mills Gas-Works.**—The Clerk of the New Mills Local Board (Mr. J. Pollitt) last week issued a statement which showed that the working of the gas undertaking last year resulted in a dead loss of £284, of which £200 was due to the extra cost of the coal purchased during the coal dispute.

**Curtailment of Street Lighting at Newcastle.**—The Newcastle City Council, on the suggestion of the Lighting Committee, have determined to only partially light the streets for four months from the 28th inst. This will put 1200 lamps out of use during that period; and it is calculated that a saving of £1020 will be effected.

**English Coal for the Hamburg Gas-Works.**—According to a Berlin paper, the contract for coal for the Hamburg Gas-Works for the current year has been placed with English dealers, as the price per ton submitted by them was only 4d. higher than last year, and several shillings less than the figure quoted by the German and Westphalian coalowners.

**Projected New Water-Works for Launceston.**—Major Tulloch, R.E., lately held an inquiry at Launceston, on behalf of the Local Government Board, into an application by the Corporation for permission to borrow £10,000 for new water supply works. It was explained by the Town Clerk (Mr. C. H. Peter) that the original works were constructed about forty years since; but for many years they had been found to be totally inadequate to supply the whole borough; and the Trebussy works were added in 1869. Even after this there was an insufficient pressure to carry water over the whole of the district, with the elevations. The purpose of the present scheme was to collect the streams in New Bray (or Carn) Down, in Altarnun, and to construct filter-beds there; and at Windmill Hill they proposed to build a service reservoir to hold 350,000 gallons. The Engineer's estimate of the cost was £9669, including compensation. Evidence was afterwards given by the Engineer (Mr. Jenkin).

**Progress of Electric Lighting in Sheffield.**—On the site of their old premises, the Sheffield Electric Lighting and Power Company have erected a large station, and have put themselves in a position to meet the demand for electrical energy for some time to come. The new building is built in three spans, covering a superficial area of 2060 yards. The boiler-house, which is 112 ft. long by 35 ft. wide, contains five Babcock boilers, each capable of evaporating 5000 lbs. of water per hour, and a water-heater, which will deal with 3000 gallons of water per hour. At the other end of the boiler-house is the arc lighting plant, consisting of a horizontal compound jet condensing engine, belted to a counter-shaft supplying power to three Thomson-Houston arc lighting machines. Each machine will maintain fifty 10-ampère lamps in series. In the engine-house, two spans have been reserved for the engines and dynamos for the incandescent supply. The plant at present in use occupies only a part of one of the spans; but foundations have been provided for an additional 500-horse power plant, which it is anticipated will immediately be required to meet the coming demand for current, the present charge for which is 6d. per Board of Trade unit. The new works were recently inaugurated by the Mayor (Alderman E. S. Foster).

**The Belfast New Water Scheme and Compensation to Mill-Owners.**—At the County of Antrim Assizes on the 19th and 20th ult., Mr. Justice Murphy had before him an action brought by Messrs. J. W. Johnston, Mr. R. H. Bland, and Mr. T. H. Torrens against the Belfast City and District Water Commissioners, traversing an award made by the Government Arbitrator (Mr. E. Murphy) in respect of the injury to a stream of water flowing into the village of Glynn by works that had been constructed by the Commissioners in pursuance of powers which they acquired in 1889. The claim that was put forward by the traversers was in respect of four different mills that lay upon the stream, and were fed by it. The Commissioners, for the purpose of increasing their supply of water, had taken the best portion of the drainage area which supplied the River Glynn with water. Instead, however, of giving water compensation, they had chosen to offer money compensation. The traversers claimed £2600; while the Arbitrator only awarded £680. Evidence was adduced on behalf of the traversers as to the deterioration of the value of the mills; and it was submitted that the gaugings laid by the Commissioners before the Arbitrator were unsatisfactory. On the other side, it was contended that the Arbitrator, who had had a great deal of experience in dealing with such matters, had awarded an ample sum. The Jury found for the traversers £1500; and judgment was marked accordingly.

**The Proposed Purchase of the Guiseley Water-Works by the Local Board.**—At a recent meeting of the Guiseley Local Board of Health, a letter was read from the Local Government Board, inquiring what steps the Board were taking to remedy the defective condition of the water supply referred to in the last two annual reports of the Medical Officer of Health. Minutes were also read showing that a special meeting of the Board had been held in Committee to consider the question of purchasing the water-works. It was at this meeting resolved to renew the offer to the Water Company of 20s. per share. To this the Directors had responded by saying that they could not accept it, as the resolution of a full meeting of shareholders had decided that the price should be 23s. per share. During the course of a discussion which followed, it was stated that the understanding was that the Board, in addition to offering 20s. per share, agreed to take the responsibility of the loans negotiated by the Company. The share capital amounted to £4500, and the loans to £3583; so that, at 20s. per share, the total cost would amount to £8083. Beyond this, the Board's Engineer (Mr. Preston) recommended that a new reservoir should be constructed at a cost of about £1500. The members agreed in considering that 20s. per share was full value for the undertaking; and various gentlemen declared that the shares had latterly been sold at 19s., 17s., and even 15s. each. On the other hand, it was stated that the Company had for seventeen years paid an annual dividend of 5 per cent. It was eventually resolved that the Clerk should be instructed to write to the Company, stating that the Board could only adhere to their previous resolution not to make any advance on 20s. per share for the purchase of the property; and that an early and definite reply be requested, in order that the Board might answer the letter from the Local Government Board.

**The New Conveyor Company's Appliances.**—The Gas Committee of the Huddersfield Corporation have placed with the New Conveyor Company, Limited, the order for the elevators and accessories for their new purifier-house. The Company have also received instructions to supply the engines and coal-handling machinery for the new retort-house at the Rochdale Gas-Works.

**Gainsbro' Water Supply.**—At the meeting of the Gainsbro' Local Board yesterday week, the Water Committee recommended the substitution of a second borehole, instead of a deep well; this being stated to effect a saving of £2500. The Chairman of the Committee moved the adoption of the scheme, and advocated that the £2500 should be expended in the construction of another reservoir. The proposal was adopted; and the Engineer is to proceed with the work at once.

**Gas-Works Extensions at Keighley.**—A series of municipal projects for which loans are required engaged the attention of Colonel J. O. Hasted, R.E., of the Local Government Board, at a public inquiry at Keighley last Thursday. The Town Clerk (Mr. G. Burr) in referring to an application for £41,000 for gas-works purposes, traced the progress of the undertaking from the time when the Improvement Commissioners undertook the erection of works in 1825, at a cost of £6000; the town population then being only something like 5000. Larger works were built about 1855; and subsequent to 1873 the present works at Thwaites were erected. From 1825 to the present time, although £136,197 had been spent upon permanent works, only £75,091 had been borrowed; the remainder having been provided out of the gas profits. Since 1874, the number of customers had increased from 4139 to 9758; and the quantity of gas made from 71 million cubic feet to 201 millions. The net price of gas had been reduced in the same period (to small borough customers) from 4s. 0½d. to 2s. 4½d. net per 1000 cubic feet. It was proposed, in view of the fact that the present works were being taxed to their full capacity, to enlarge them to about double the capacity. In view of the determination of the Corporation to apply in the coming session for powers to supply the electric light, and that the gas for the public lamps was now supplied free of charge, the profits in the future could not be expected to be so large as heretofore.

## GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 642.)

| Issue. | Share | When ex-Dividend. | Dividend or Div. & Bonus. | NAME. | Paid per Share | Closing Prices. | Rise or Fall in Wk. | Yield upon investment. |
|---|---|---|---|---|---|---|---|---|
| £ | | | p. c. | GAS COMPANIES. | | | | £ s. d. |
| 590,000 | 10 | 13 Oct. | 10½ | Alliance & Dublin 10 p. c. | 10 | 18—19 | +½ | 5 10 6 |
| 100,000 | 10 | " | 7½ | Do. 7 p. c | 10 | 12⅞—13⅛ | .. | 5 11 1 |
| 300,000 | 100 | 2 Jan. | 5 | Australian (Sydney) 5 % Deb. | 100 | 106—108 | .. | 4 12 6 |
| 100,000 | 20 | 14 Dec. | 8 | Bahia, Limited | 20 | 10—11 | .. | 14 10 10 |
| 200,000 | 5 | 15 Nov. | 6½ | Bombay, Limited | 5 | 4¾—5¼ | .. | 5 3 10 |
| 40,000 | 5 | " | 6½ | Do. New | 4 | 3½—4 | .. | 5 10 0 |
| 380,000 | Stck. | 28 Feb. | 11½ | Brentford Consolidated | 100 | 217—222 | .. | 5 3 7 |
| 180,000 | " | " | 8½ | Do. New | 100 | 165—170 | .. | 5 0 0 |
| 220,000 | Stck. | 15 Mar. | 11½ | Brighton & Hove Original | 100 | 205—215 | .. | 5 6 11 |
| 888,500 | Stck. | 28 Feb. | 5 | Bristol | 100 | 105—108 | +2 | 4 12 6 |
| 320,000 | 20 | 29 Mar. | 11½ | British | 20 | 45—47* | .. | 4 15 10 |
| 50,000 | 10 | 28 Feb. | 11½ | Bromley, Ordinary 10 p. c. | 10 | 21—22 | .. | 5 4 7 |
| 51,510 | 10 | " | 8½ | Do. 7 p. c. | 10 | 15½—16½ | .. | 5 3 0 |
| 328,750 | 10 | 28 July | 2 | Buenos Ayres (New) Limited | 10 | 6–7 | .. | 2 17 2 |
| 200,000 | 100 | 2 Jan. | 6 | Do. 6 p. c. Deb. | 100 | 103—103 | .. | 5 16 7 |
| 150,000 | 20 | 23 Feb. | 8 | Cagliari, Limited | 20 | 26—27 | .. | 5 18 6 |
| 550,000 | Stck. | 13 Oct. | 12½ | Commercial, Old Stock | 100 | 255—260 | .. | 4 16 2 |
| 165,000 | " | " | 9½ | Do. New do. | 100 | 193—197 | .. | 4 16 5 |
| 160,762 | " | 14 Dec. | 4½ | Do. 4½ p. c. Deb. do. | 100 | 128—133 | .. | 5 7 9 |
| 800,000 | Stck. | 14 Dec. | 13 | Continental Union, Limited | 100 | 230—235 | .. | 5 10 7 |
| 200,000 | " | " | 10 | Do. 7 p. c. Pref | 100 | 203—207 | .. | 4 16 7 |
| 535,000 | Stck. | 28 Feb. | 5 | Crystal Palace Ord. 5 p.c. Stk | 100 | 105—110 | .. | 4 10 11 |
| 486,090 | 10 | 31 Jan. | 10 | European, Limited | 10 | 22—23 | .. | 4 6 11 |
| 354,060 | 10 | " | 10 | Do. Partly paid | 7½ | 15½—16½ | .. | 4 10 11 |
| 5,646,590 | Stck. | 14 Feb. | 12 | Gaslight & Coke, A, Ordinary | 100 | 232—237 | −1 | 5 1 3 |
| 100,000 | " | " | 4 | Do. B, 4 p. c. max. | 100 | 98—102 | .. | 3 18 5 |
| 665,000 | " | " | 10 | Do. C, D, & E, 10 p.c. Pf. | 100 | 273—278 | .. | 3 12 0 |
| 30,000 | " | " | 5 | Do. F, 5 p. c. Prf. | 100 | 130—135 | .. | 3 14 1 |
| 60,000 | " | " | 7½ | Do. G, 7½ p. c. do. | 100 | 192—195 | .. | 3 16 11 |
| 1,300,000 | " | " | 7 | Do. H, 7 p. c. max | 100 | 175—180 | .. | 3 17 9 |
| 463,000 | " | " | 10 | Do. J, 10 p. c. Prf. | 100 | 270—275 | .. | 3 12 9 |
| 476,000 | " | " | 6 | Do. K, 6 p. c. Prf. | 100 | 163—168 | .. | 3 11 5 |
| 1,061,150 | " | 4 Dec. | 4 | Do. 4 p. c. Deb. Stk. | 100 | 127—130 | .. | 3 1 6 |
| 894,850 | " | " | 4½ | Do. 4½ p. c. do. | 100 | 130—135 | .. | 3 6 8 |
| 908,000 | " | " | 6 | Do. 6 p. c. do | 100 | 177—182 | +2 | 3 5 11 |
| 3,800,000 | Stck. | 15 Nov. | 12 | Imperial Continental | 100 | 215—220 | +3 | 5 9 1 |
| 75,000 | 5 | 14 Dec. | 6 | Malta & Mediterranean, Ltd. | 5 | 4½—5 | .. | 6 0 0 |
| 560,000 | 100 | 2 Apl. | 5 | Met. of Melbourne, 5p. c. Deb. | 100 | 108-110* | +½ | 4 10 11 |
| 541,920 | 20 | 15 Nov. | 5 | Monte Video, Limited | 20 | 13½—14½ | +½ | 6 18 0 |
| 150,000 | 5 | 30 Nov. | 8 | Oriental, Limited | 5 | 6–6⅛ | .. | 6 3 1 |
| 60,000 | 5 | 29 Mar. | 7 | Ottoman, Limited | 5 | 3¾—4¼* | .. | 7 7 4 |
| 166,870 | 10 | 31 Jan. | 2 | Pará Limited | 10 | 2 2⅛ | .. | 8 0 0 |
| | | | | People's Gas of Chicago— | | | | |
| 420,000 | 100 | 2 Nov. | 6 | 1st Mtg. Bds. | 100 | 103—109 | .. | 5 10 1 |
| 500,000 | 100 | 1 Dec. | 6 | 2nd Do. | 100 | 97—102 | .. | 5 17 8 |
| 150,000 | 10 | 13 Oct. | 5 | San Paulo, Limited | 10 | 8½—9½ | .. | 5 5 3 |
| 500,000 | Stck. | 28 Feb. | 15½ | South Metropolitan, A Stock | 100 | 315—320 | +2 | 4 10 11 |
| 1,350,000 | " | " | 12 | Do. B do. | 100 | 255—260 | .. | 4 12 3 |
| 260,000 | " | " | 13 | Do. C do. | 100 | 260—265 | .. | 4 18 1 |
| 750,000 | " | 17 Jan. | 5 | Do. 5 p. c. Deb. Stk. | 100 | 152—155 | .. | 3 4 6 |
| 60,000 | Stck. | 28 Feb. | 11½ | Tottenham & Edm'nton, "A" | 100 | 210—215 | .. | 5 7 0 |
| | | | | WATER COMPANIES. | | | | |
| 745,967 | Stck. | 29 Dec. | 10 | Chelsea, Ordinary | 100 | 272—277 | .. | 3 12 3 |
| 1,720,252 | Stck. | 13 Oct. | 8 | East London, Ordinary | 100 | 218—223 | .. | 3 11 9 |
| 544,440 | " | 29 Dec. | 4½ | Do. 4½ p. c. Deb. Stk. | 100 | 147—150 | .. | 3 0 0 |
| 700,000 | 50 | 14 Dec. | 8½ | Grand Junction | 50 | 113—117 | +1 | 3 12 6 |
| 708,000 | Stck. | 28 Feb. | 11½ | Kent | 100 | 288—293 | .. | 3 18 6 |
| 1,043,800 | 100 | 29 Dec. | 9½ | Lambeth, 10 p. c. max. | 100 | 248—253 | .. | 3 15 1 |
| 406,200 | 100 | " | 7½ | Do. 7½ p. c. max. | 100 | 200—205 | .. | 3 13 2 |
| 310,000 | Stck. | 29 Mar. | 4 | Do. 4 p. c. Deb. Stk. | 100 | 132—135* | .. | 2 19 3 |
| 500,000 | 100 | 14 Feb. | 12½ | New River, New Shares | 100 | 365—370 | .. | 3 5 6 |
| 1,000,000 | Stck. | 31 Jan. | 4 | Do. 4 p. c. Deb. Stk | 100 | 133—136 | .. | 2 18 10 |
| 902,300 | Stck. | 14 Dec. | 6 | S'thwk & V xnall, 10 p. c. max. | 100 | 157—162 | +2 | 3 14 1 |
| 126,500 | 100 | " | 6 | Do. D 7½ p. c. do. | 100 | 147—152 | .. | 3 19 0 |
| 1,155,066 | Stck. | 14 Dec. | 10 | West Middlesex | 100 | 265—270 | .. | 3 14 1 |

*Ex div.

# GWYNNE & BEALE'S PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM LONDON."

## GWYNNE & CO., TELEPHONE No. 2698.

### HYDRAULIC AND GAS ENGINEERS, BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

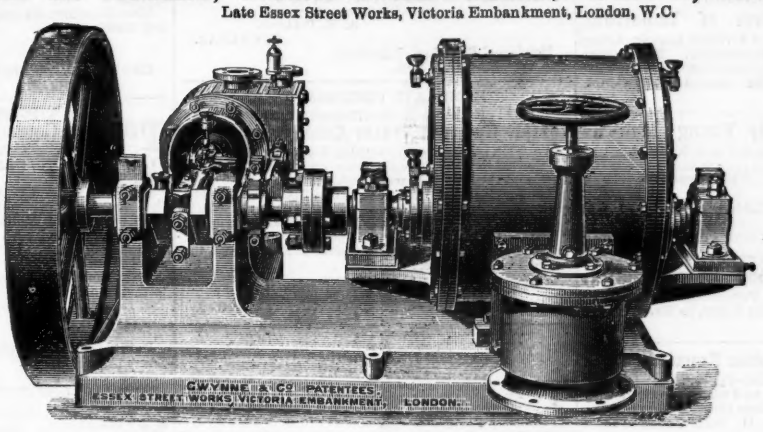
Late Essex Street Works, Victoria Embankment, London, W.C.

Thirty-three Medals at all the Great International Exhibitions have been awarded to GWYNNE & Co., for Gas Exhausters, &c.

They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality.

The result is that in every instance their work is giving the fullest satisfaction.

They have completed Exhausters to the extent of 30,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work, and can be referred to.




Engine and Exhauster Combined on One Bed-Plate.

*GWYNNE & Co.'s Exhausters are constructed of large size to pass the required quantity of Gas at very slow speeds; the wear and tear being reduced to a Minimum.*

*Catalogues and Testimonials sent on Application.*

Their Exhausters can be made, when desired, on their New Patent Principle, to pass Gas without the slightest oscillation or variation in pressure.

*NO OTHER MAKER CAN DO THIS.*

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, STEAM-PUMPS for Tar, Liquor, or Water; PATENT SELF SEALING AND CLEANING RETORT-LIDS AND MOUTHPIECES; CENTRIFUGAL PUMPS and PUMPING ENGINES specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH-SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.


**NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.**

**Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.**


OXIDE OF IRON.

**O'NEILL'S Oxide has a larger annual** sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

**ANDREW STEPHENSON, Agent.** All communications *re* OXIDE to be addressed to PALMERSTON BUILDINGS, E.C.

**BRIN'S Oxygen Company, Limited,** Westminster. ANDREW STEPHENSON, Agent.

**WINKELMANN'S "VOLCANIC"** CEMENT. Fire Resistance up to 4500° Fahr. In use in most Continental Gas-Works, and in more than 200 British Gas-Works. [See Advt., p. 678.]
ANDREW STEPHENSON, 182, Gresham House, Old Broad Street, LONDON, E.C. Telegrams: "Volcanism, London."

**LIQUOR, Tar, and Spent Oxide wanted.**
BROTHERTON AND CO., Ammonia and Tar Distillers, BIRMINGHAM, LEEDS, and WAKEFIELD.

GOLD MEDAL, 1892.

**TUBES and Fittings for Gas, Steam, and** Water, in stock to 8 inches diameter; Iron and Steel Ascension-Pipes.
JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

**JOHN RILEY & SONS, Chemical Manu-**facturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

CHARTERING, FORWARDING, AND INSURANCE.

**ROBERT BRUCE FITZMAURICE, 29,** Great St. Helens, London, Shipping Agent to several Gas Companies and Plant Manufacturers, would be glad to UNDERTAKE LARGE or SMALL SHIPMENTS to any Port.

**HUTCHINSON BROTHERS,** Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See last week, p. 598.)
Telegrams: "HUTCHINSON BROS., BARNSLEY."

**PORTER & CO., Gowts Bridge Works,** LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for, Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings, at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."

**JAMES LAWRIE & Co. supply Best** SCOTCH CANNEL COALS, Best FIRE-CLAY RETORTS, BRICKS, TILES, and LUMPS; BOILER SEATING BLOCKS, FLUE COVERS, and SILICA BRICKS for SPECIAL FURNACE WORK; COKE BARROWS, BOGIES, and SMALL WAGONS.
Postal Address: 1, WHITTINGTON AVENUE, E.C.
Telegram Address: "EIRWAL LONDON."

**W. C. HOLMES & CO., Huddersfield;** AND 80, CANNON STREET, LONDON, Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. II., centre of JOURNAL.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

**J. & J. BRADDOCK, Globe Meter Works,** Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

**JOHN NICHOLSON & SONS, Chemical** Works, Leeds, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

**MR. J. C. CHAPMAN, Fellow of the** Chartered Institute of Patent Agents, advises on all matters connected with LETTERS PATENT FOR INVENTIONS and the PROTECTION OF TRADE MARKS, &c., at home and abroad. Preliminary Information and Handbook on application.
70, Chancery Lane, LONDON, W.C.

SPECIAL PAINT FOR GAS-WORKS.

**JOHN E. WILLIAMS AND CO.,**
VICTORIA PAINT WORKS, MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.
GAS PLANT CEMENT
FOR ALL LEAKAGES.

HYDRATED OXIDE OF IRON.

**PREPARED from pure Iron**
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

**ADVERTISER** (age 25) requires a Situation as METER INSPECTOR or REPAIRER. Able to fix Meters. Five years' experience. Total Abstainer. Good character. Been in present Situation two years. Good reasons for leaving.
Address No. 2368, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

**BALE & CO., direct Importers from** Ireland. Sample and Price on application.
OXIDE PAINT, SULPHURIC ACID, & Chemicals.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE LONDON."

OXIDE OF IRON.

**FINEST Quality of Natural Bog Ore.**
Particulars and price, apply to Mr. T. L. ARCHER, 20, Fennel Street, MANCHESTER.

**SADLER AND CO., LIMITED,** MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 315, St. Vincent Street, GLASGOW; and 85, Water Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office: MIDDLESBROUGH. Correspondence invited.

**DRAWINGS, Tracings, Specifications,** Quantities, Strains, &c., prepared by an experienced Gas-Engineering Draughtsman. Plans of Works made, copied, or enlarged. Illuminated Addresses in first-class style. Writings of all kinds, Engrossments, &c.
Address J. H. OPPENHEIM, 27, FORE STREET, E.C.

**ALWAYS a Buyer of Spent Oxide, Tar,** and AMMONIACAL LIQUOR.
Apply to J. HARDMAN, Milton, STAFFORDSHIRE.

**WANTED, a Situation by a Young Man** (age 28). Six years' experience, and has had charge of Small Works three years.
Apply to H. BARNES, Gas-Works, YARM-ON-TEES.

**WANTED, by a Gas Engineer, an En-**gagement Abroad. Has had eight years' experience in South America as Engineer and Manager.
Apply, by letter, to No. 2355, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**WATER-WORKS Manager seeks Ap**pointment—Engineering and Clerical. Age 34 First-class references.
Address No. 2367, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**WANTED, at once, a good Gas Stoker,** used to Shovel Charging. Married Man preferred. Must have good reference from last employer. Wages, 25s. per week.
Apply to Mr. G. HICKFORD, Manager, Gas-Works, Leatherhead, SURREY.

**WANTED, by a Young Man (age 32), a** Situation in Gas-Works. Has a thorough practical knowledge of Main and Service laying, Gas-Fitting, Meter and Stove fixing, Wet and Dry Meter repairing, &c. Eighteen years' character.
Address No. 2369, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**WANTED, by the Advertiser (age 30)** a Situation as GAS-FITTER, METER INSPECTOR, &c. Thoroughly conversant with the routine of a Gas-Works, and well up in Electrical Work. Good Testimonials. No objection to going abroad.
Address, E. RIDDE, 4, South Terrace, HASTINGS.

AGENT WANTED.

**ESTABLISHED Firm of Importers** would appoint first-class AGENT having strong influence with London Gas Companies. The quality is the finest in the market. Liberal terms.
Address No. 2350, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**WANTED, a steady Young Man as** STOKER. Able to attend to Exhauster.
Apply, stating age and wages required, to
T. WIGGLESWORTH,
Manager.
Quakers' Yard Gas-Works, Treharris.

RAMSGATE CORPORATION.
(GAS DEPARTMENT.)

**WANTED, a good Retort Setter.**
Salary, £2 per week. Permanent work.
Apply, in the first instance, by letter, to Mr. WILLIAM A. VALON, RAMSGATE.

**WANTED, a Gas-Meter Repairer, with** experience as House Gas-Fitter.
Apply, by letter, stating age and wages required, and enclosing copies of not more than three testimonials, to No. 2364, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**WANTED, for a Gas-Works in the** Eastern Counties, a YOUNG MAN, not over 21 years of age, with a sound knowledge of Practical Chemistry acquired by not less than three years' experience in a good Laboratory. Testimonials not to be forwarded. Salary £70 per annum.
Apply, by letter, to No. 2366, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SOWERBY BRIDGE LOCAL BOARD.

**WORKING Foreman required for the** Gas-Works, making 100 millions. Must be a good Carbonizer, able to control men, and thoroughly acquainted with Engine, Exhauster, and general Working. Wages not less than £3 per week.
Applications, stating age and accompanied by copies of two recent testimonials, must be addressed to the Chairman of the Gas Committee, Gas-Works, Sowerby Bridge, not later than Thursday, April 19, 1894.
JOHN MARSLAND,
Engineer and Manager.
Gas-Works, Sowerby Bridge,
April 4, 1894.

**FOR SALE—A Two-lift Gasholder** (Capacity 95,000 feet), with Cast-Iron Framing and Tank.
Address No. 2361, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**FOR SALE—An Evans Photometer,** recently overhauled, in good condition; to be seen at work. Also a number of 5-inch BRIDGE and DIP PIPES; several lengths of HYDRAULIC MAIN, and a few faced MOUTHPIECES, 18 in. by 15 in.
Apply to Mr. GEO. WINSTANLEY, C.E., Engineer and General Manager, Corporation Gas-Works, COVENTRY.

GAS PLANT FOR SALE.

**MESSRS. FISON and CO., Burley-in-** Wharfedale, have FOR SALE GAS PLANT AND TESTING APPARATUS, as follows:—
One Hydraulic Main (11 feet long) for seven Retorts, with Valves, 5-inch Dip-Pipes and H-Pipes complete,
One Hydraulic Main for fifteen Retorts (three settings of fives), with Valves, 5-inch Dip-Pipes, and H-Pipes complete.
One Morris and Cutler's patent Condenser, 6-inch Connections.
One Fison's Patent Exhauster, 40,000 cubic feet per day.
One Scrubber, 6-inch Connections.
Set of four Purifiers (6 ft. by 6 ft.) with 6-inch Centre-Valve.
One Purifier (6 ft. by 6 ft.) with 6-inch Valves.
Apparatus for Lifting Purifier-Lids.
Two 6-inch Governors.
Also Mouthpieces, Ascension-Pipes, one 6-inch Four-Way Valve, several 6-inch Valves, two 4-inch Valves, and 4-inch Ram Pump.
One 100-inch Evans Photometer, with Candle-Balance, Standard Burner, &c., complete; also Experimental Meter-Balance, Governor, King's Gauge, Sulphuretted Hydrogen Test, Regulating Cock and Quadrant, and other sundry Accessories.
One Bench for Photometer.
One Lowe's Jet Photometer, with all latest improvements.
One Barometer.
One Gas Referees' Cubic Foot Measure, with all accessories complete.
The above all in good condition.
For further Information, apply to G. W. LUPTON, Manager, Gas-Works, Otley, YORKS.

CANNEL.

**THE Aberavon Corporation invite** TENDERS for 200 tons of CANNEL, delivered f.o.b. or f.o.r. at Port Talbot.
Tenders, stating the description, &c., and endorsed "Tender for Cannel," to be sent to the undersigned on or before Monday, the 23rd of April, 1894.
The lowest or any tender will not necessarily be accepted.
By order,
M. TENNANT,
Town Clerk.
Aberavon.

**THE Gas Committee of the Heywood** Corporation invite TENDERS for the supply of about 450 yards each of 3-inch and 4-inch CAST-IRON PIPES and SPECIALS.
Specification and Form of Tender may be obtained upon application to W. Whatmough, Gas Manager.
Sealed tenders, endorsed "Iron Pipes," to be sent to me not later than Tuesday, April 17, 1894.
By order,
A. B. PILLING,
Town Clerk.
Municipal Buildings, Heywood,
March 30, 1894.

RAMSGATE CORPORATION.
(GAS AND WATER DEPARTMENT.)

**THE Gas and Water Committee invite** TENDERS for the surplus TAR (100,000 gallons, or thereabouts) to be made between the 1st of April, 1894, and the 31st of March, 1895.
Tenders to be returned on or before Saturday, April 14, addressed to the Chairman of the Gas and Water Committee, Hardres Street, Ramsgate, and endorsed "Tender for Tar."
The Committee do not bind themselves to accept the highest or any tender.
Full particulars on application to
WILLIAM A. VALON,
Engineer.

BOROUGH OF RAMSGATE FRONT IMPROVEMENTS.
CONTRACT No. 2.

**THE Town Council invite Tenders for** the erection of a HARBOUR MASTER'S HOUSE on a Site on the West Cliff.
Tenders to be sent in, addressed to the Chairman of the Front Improvements Committee, not later than Ten a.m., on Thursday, April 19 next, endorsed "Contract No. 2."
Copy of Specification, Quantities, and Conditions will be forwarded to any applicant desiring to have them, on receipt of £3 3s., which will be returned when a *bonâ-fide* tender is submitted, together with the Specifications, Conditions, and Bill of Quantities fully monied out.
Drawings may be seen and further particulars obtained on application to William A. Valon, Engineer, Ramsgate; or 140 and 141, Temple Chambers, Temple Avenue, E.C.
The Council do not bind themselves to accept the lowest or any tender.
By order,
W. A. HUBBARD,
Town Clerk.
Town Hall, Ramsgate,
March 30, 1894.

BOROUGH OF RAMSGATE FRONT IMPROVEMENTS.
CONTRACT No. 3.

**THE Town Council invite Tenders for** the erection of a CUSTOMS HOUSE in Lower Harbour Street.
Tenders to be sent in, addressed to the Chairman of the Front Improvements Committee, not later than Ten a.m., on Thursday, April 19 next, endorsed "Contract No. 3."
Copy of Specification, Quantities, and Conditions will be forwarded to any applicant desiring to have them, on receipt of £3 3s., which will be returned when a *bonâ-fide* tender is submitted, together with the Specifications, Conditions, and Bill of Quantities fully monied out.
Drawings may be seen and further particulars obtained on application to William A. Valon, Engineer, Ramsgate; or 140 and 141, Temple Chambers, Temple Avenue, E.C.
The Council do not bind themselves to accept the lowest or any tender.
By order,
W. A. HUBBARD,
Town Clerk.
Town Hall, Ramsgate,
March 30, 1894.

GASHOLDER TANK.

**THE Directors of the Torquay Gas** Company are prepared to receive TENDERS for the construction of a BRICK GASHOLDER TANK, 114 feet diameter and 26 feet deep, at their Works, Hollacombe, Paignton.
The Site, Drawings, and Specifications can be seen, and Form of Tender obtained, by application to the Engineer, Mr. R. Beynon, on payment of the sum of Two Guineas, which will be returned on receipt of a *bonâ-fide* tender.
Sealed tenders, endorsed "Tender for Gasholder Tank," must be sent to the undersigned, on or before Ten a.m., Monday, April 16 prox.
The Directors do not bind themselves to accept the lowest or any tender.
By order,
JOHN KITSON,
Secretary.
Vaughan Parade, Torquay,
March 30, 1894.

LEEDS CORPORATION GAS DEPARTMENT.

**TENDERS required as below:—**
For Turned and Bored and other PIPES, BENDS, TEES, SYPHON WELLS, and other IRREGULAR PIPES.
For BRASS MAIN COCKS.
For 2½, 3, and 4-inch Self-faced BRADFORD or HALIFAX FLAGS.
For RETORT MOUTHPIECES, STAND-PIPES, DOOR-FRAMES, SPECIAL BENDS, TEES, FLANGE PIPES, &c.
Samples may be seen on application at the Stores Department, 21, Dewsbury Road, and Forms of Tender and Specification may be had on application to Mr. Lupton at the Offices of the Gas Department, Municipal Buildings.
Endorsed tenders, addressed to the Chairman, at the Offices as above, will be received not later than Wednesday, the 18th of April next; and no tender will be considered except on the form provided.
The lowest or any tender will not necessarily be accepted.

TO MAKERS OF SULPHATE OF AMMONIA PLANT.

**THE Directors of the Tynemouth Gas** Company are prepared to receive TENDERS for the erection of a complete SULPHATE OF AMMONIA PLANT.
Particulars of capacity of Plant, &c., from the undersigned.
The Directors do not agree to accept the lowest or any tender.
W. HARDIE, jun.,
Engineer.
Gas-Works, North Shields,
April 6, 1894.

TIPTON GAS-WORKS.

**THE Gas Committee of the Tipton Local** Board invite TENDERS for the supply of FIRE-CLAY RETORTS, BRICKS, PATENT REGENERATOR TILES, &c.
Specification and Form of Tender may be obtained at the Gas-Works, on application to Mr. Vincent Hughes, the Engineer and Manager.
Sealed and endorsed tenders to be sent to me, the undersigned, not later than Ten a.m., on Monday, April 23 inst.
The Committee do not bind themselves to accept the lowest or any tender.
By order,
GEO. M. WARING,
Clerk to the Board.
Public Offices, Tipton,
April 6, 1894.

IMPERIAL CONTINENTAL GAS ASSOCIATION
INCORPORATED BY ACT OF PARLIAMENT.

**NOTICE is Hereby Given, that the** HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association will be held at the City Terminus Hotel, Cannon Street, London, E.C., on Tuesday, the 1st of May next, at 2.30 p.m. precisely, when a Report will be made to the Proprietors, a Dividend declared for the Half Year ended the 31st of December last, and the usual ordinary Business of such Meeting transacted.
Notice is Hereby also Given, that the TRANSFER BOOKS WILL BE CLOSED from the 17th inst. to the 1st prox., both days inclusive.
And Notice is further Given, that an EXTRAORDINARY GENERAL MEETING of the Proprietors will be held on the said 1st of May next, immediately after the Half-Yearly Ordinary General Meeting, to consider a proposal of the Board of Directors to AUTHORIZE the BORROWING of a sum of money on DEBENTURE STOCK, in accordance with the Provisions of the Imperial Continental Gas Association Act, 1893, and, if approved, to order the same.
By order of the Board,
R. S. GARDINER,
Secretary.
21, Austin Friars, London, E.C.,
April 9, 1894.

By Order of the Executors of Mrs. C. Black, deceased, and others.—Gas Stocks and Shares in the following Companies:—
South Metropolitan Gas Company.
Tottenham and Edmonton Gaslight and Coke Company.
Ascot District Gas Company.
Romford Gas and Coke Company.
Harrow District Gas Company.
Chelmsford Gas Company.
Brentwood Gas Company.
Woking Gas Company.
Uxbridge District Gas Company.

**MR. ALFRED RICHARDS will Sell** the above by AUCTION, at the Mart, Tokenhouse Yard, E.C., on Tuesday, April 17, at One for Two o'clock precisely, in lots.
Particulars of J. JOBSON, Esq., Solicitor, 57, LINCOLN'S INN FIELDS, W.C.; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C., and 816, High Road, TOTTENHAM.

BY ORDER OF EXECUTORS.

SOUND INVESTMENTS IN STOCK AND SHARES IN FIRST-RATE DIVIDEND-PAYING FOREIGN GAS COMPANIES.

**MESSRS. EDWIN FOX AND BOUS-** FIELD will SELL, at the Mart, to-morrow, Wednesday, April 11, at Two, in 126 Lots, highly remunerative INVESTMENTS of a character rarely offered to competition, comprising Stock and Shares in the following first-rate Dividend-Paying Gas Companies, acquired by the late Edward Frith, Esq., between 1862 and 1879, as safe-holding family investments, and now realized by his Executors for the purpose of division:—
EUROPEAN GAS—100 £10 SHARES (fully paid), and 100 £10 SHARES (£7 10s. paid). Dividend, 10 per cent. Bonus in 1890, 50 per cent.
ORIENTAL GAS—324 £5 SHARES (fully paid), and 324 £5 SHARES (£4 10s. paid). Dividend, 8 per cent.
MALTA AND MEDITERRANEAN GAS—150 £5 SHARES (fully paid; Dividend 6 per cent.); and 58 £5 SEVEN-AND-A-HALF PER CENT. PREFERENCE SHARES (fully paid).
CONTINENTAL UNION GAS—£4200 ORDINARY STOCK. Dividend, 13 per cent.
MONTE VIDEO GAS—40 £20 SHARES (fully paid). Dividend, 5 per cent.
Particulars of Messrs. POTTER, SANDFORD, AND KILVINGTON, Solicitors, No. 30, King Street, CHEAPSIDE, E.C.; and of Messrs. EDWIN FOX AND BOUSFIELD, 99, Gresham Street, BANK, E.C.

For **FIRE-BRICKS,** the most durable for **GAS-FURNACES,**
ADDRESS
**JAMES WHITE & Co., Limited,**
ALBERT WORKS, WIDNES.

## HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cubic feet.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For prices, f.o.b. Ship or Delivered by Rail, apply to
THE WALLSEND & HEBBURN COAL COMPANY, LTD.,
8 Lombard Street, NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

HUNTER'S
## OXIDE OF IRON.

JAMES HUNTER, LESSEE, MINER, AND SHIPPER OF
NATURAL IRISH BOG ORE.

This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.

Samples and Prices on application.
11, BAY STREET, PORT GLASGOW.
Telegrams: "HUNTER, PORT GLASGOW."
Established 1872.

## LONDONDERRY GAS COALS
FROM THE
## MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO
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Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887,
for
## CANNEL & COAL.

TYNE
## BOGHEAD CANNEL.

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

## EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 70 per cent.

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Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

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PRESENT production 4000 tons per working day. Area of coal about 5000 acres, including the largest remaining workable proportion of pure HUTTON SEAM GAS COAL. Analysis of HOLMSIDE GAS COAL *in bulk as shipped* gives 10,500 cubic feet of Gas per ton, of an Illuminating Power of 16½ candles. The Sulphur is about 1 per cent., and the Ash 1¾ per cent. The Coal cokes well, and leaves about 70 per cent. of excellent Coke. To show the progress of HOLMSIDE COALS, it may be mentioned that the quantity carbonized by the London Gas Companies in 1885 was about 200,000 tons; whereas the present consumption of HOLMSIDE COALS in London alone is at the rate of nearly
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Gas Companies are solicited to try Samples of the
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ANALYSIS AND PRICES ON APPLICATION.
T. B. KITTEL, SHEFFIELD.

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Worked by THE HARTON COAL CO., LTD.
**Output about 3000 tons per day.**

ANALYSIS—

| | | |
|---|---|---|
| Yield of Gas per ton . | 10,500 | Cubic Feet. |
| Illuminating Power . | 16·9 | Candles. |
| Coke . . . . . | 66·7 | Coke. |
| Sulphur . . . . . | 0·86 | Sulphur. |
| Ash . . . . . | 2·04 | Ash. |

**Boldon Gas Coals are supplied under contract to**

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Ipswich Gaslight Company, Devonport Gas Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

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WORKED BY THE
WEARDALE IRON AND COAL COMPANY, Ld.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

**The Analysis made by Messrs. J. and H. T. Pattinson, Public Analysts for Northumberland, gives 10,500 cubic feet of Gas per ton, with an Illuminating Power of 16·3 Candles and 67·3 per cent. of Coke. The following is a Working Analysis made of these Coals by the Tudhoe and Sunderland Bridge Gas Company:—**

[COPY.]
TUDHOE AND SUNDERLAND BRIDGE GAS COMPANY.
*Tudhoe Gas-Works,*
*Spennymoor,*
*8th June, 1893.*

Messrs. The
WEARDALE IRON & COAL COMPANY, LTD.

GENTLEMEN,

For the last two months we have used your **THORNLEY GAS COAL** exclusively at these gas-works; and I have pleasure in herewith giving you the actual results obtained during the trial.

Yield of Gas per ton: 10,300 cubic feet.
Yield of Coke: 13¾ cwt.
**Illuminating Power of Gas,** average of a series of tests, **17 Sperm Candles.**
The Coke was of excellent quality.
**The following is a complete ultimate Analysis of the Coal.**

| | Per Cent. |
|---|---|
| Carbon . . . . . | 83·128 |
| Hydrogen . . . . . | 5·116 |
| Oxygen . . . . . | 7·401 |
| Nitrogen . . . . . | 0·585 |
| Sulphur . . . . . | 0·620 |
| Ash . . . . . | 3·130 |
| Water . . . . . | 0·020 |
| | 100·000 |

**Analysis of the Coke.**

| | |
|---|---|
| Carbon . . . . . | 93·31 |
| Sulphur . . . . . | 0·61 |
| Ash . . . . . | 5·00 |
| Moisture . . . . . | 1·08 |
| | 100·00 |

I am, Gentlemen,
Yours truly,
A. B. COWAN,
Manager.

For Price, &c., apply to the
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QUAYSIDE, NEWCASTLE-ON-TYNE.

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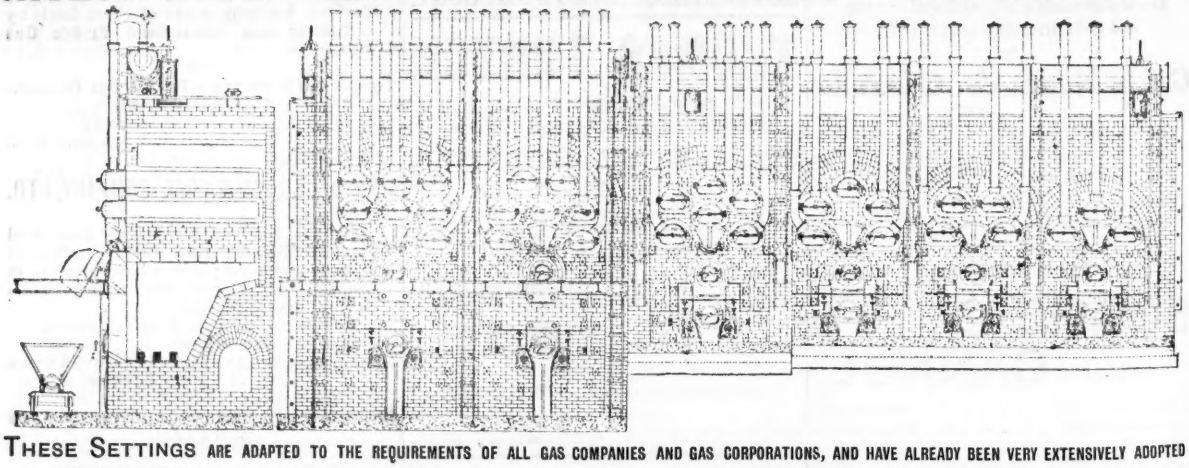
**HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.**



THESE SETTINGS ARE ADAPTED TO THE REQUIREMENTS OF ALL GAS COMPANIES AND GAS CORPORATIONS, AND HAVE ALREADY BEEN VERY EXTENSIVELY ADOPTED THEY ARE ERECTED UPON BOTH THE WORKING-STAGE AND SHALLOW-CHAMBER SYSTEMS, AND EQUALLY SATISFACTORY RESULTS ARE GUARANTEED IN BOTH CASES.
THE SETTINGS HAVE ATTAINED TO A MEASURE OF SUCCESS AND POPULARITY QUITE UNEQUALLED BY THAT OF ANY OTHER WITHIN THE SAME SPACE OF TIME. THE WORKING RESULTS OBTAINED, AND THE GENERAL SATISFACTION GIVEN, ARE DECLARED IN EVERY CASE TO EXCEED, AND IN MOST CASES CONSIDERABLY EXCEED, THE PATENTEE'S GUARANTEE. THE CONSTRUCTION AND WORKING OF THE PATENT PRODUCER AND THE PATENT CHARGING APPARATUS FOR SAME ARE ABSOLUTELY UNIQUE AND UNRIVALLED, AND ARE THE DELIGHT OF EVERY STOKER; WHILE IN EVERY OTHER PARTICULAR THEY SECURE THE HIGHEST RESULTS ATTAINABLE BY ANY REGENERATIVE SYSTEM, AND AT A MINIMUM OF COST.

Drawings and Specifications are furnished for the complete erection of Ovens, with or without Retort and Bench Mountings, or complete erection undertaken if required, and carried out by specially Trained Workmen.

**Further particulars may be obtained on application to the Patentee's Agents: C. M. HAMILTON, 5, Stuart Street, Shawlands, Glasgow; J. E. FISHER, Stourbridge; JOHN WALSH & SONS, Retort Builders, Halifax, Yorkshire; RICHARD TURNER, Retort Builder, Denton, Lancashire; and from the Principal Agent, R. F. HISLOP (son of Patentee), Gas-Works, Paisley, N.B.**

**HISLOP'S PATENT HYDRAULIC MAIN SEAL-REGULATING AND TAR-EXTRACTING VALVE** is a *Sine qua non* TO THE SATISFACTORY WORKING OF THE HYDRAULIC MAIN UNDER THE REGENERATIVE AS WELL AS OTHER SYSTEMS OF RETORTS. BEING LARGELY ADOPTED, AND AFFORDING THE HIGHEST SATISFACTION.

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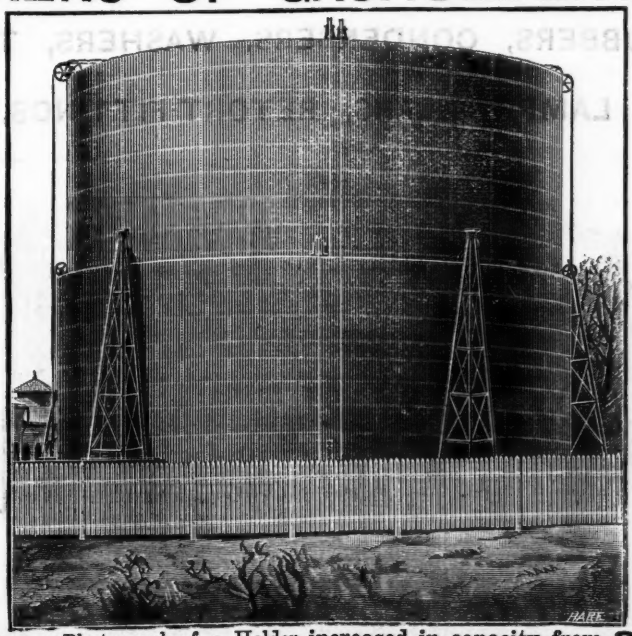

**WIRE ROPE SYSTEM**

This Engraving is taken from a Photograph of a Holder **increased in capacity from 32,000 cubic feet to 59,000 cubic feet** by the addition of a Lift. The Ropes are applied to both Lifts to supplement the Standards.

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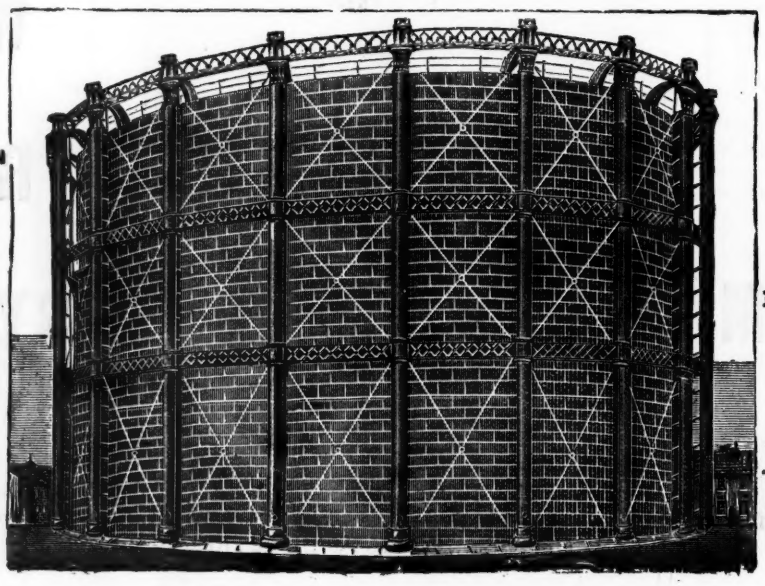

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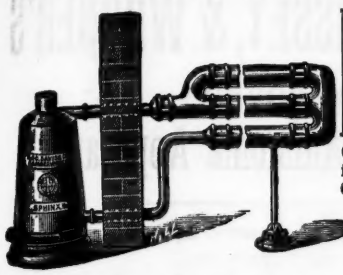

| No. | Size | Capability. | Price. |
|---|---|---|---|
| | | To Heat | £ s. |
| 193 | 8in. | 80ft. 2-in. pipe | 3 0 |
| 194 | 9in. | 100ft. „ „ | 3 15 |
| 195 | 10in. | 150ft. „ „ | 4 10 |
| 196 | 12in. | 250ft. „ „ | 5 15 |
| 197 | 15in. | 400ft. „ „ | 9 0 |

Circulating Copper Boiler, for heating Conservatories, Greenhouses, &c., or fitted to a Galvanized Water-Tank, giving a constant supply of Hot Water for Baths, Household Purposes, &c.

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This we have specially designed for boiling large quantities of water for Bath purposes, Tea Meetings, &c.; and it is cheap, strong, and serviceable.

It is fitted with a conical bottom and central tube, in order to obtain the greatest duty from the gas used, by having as large a surface as possible for the flames and hot air to play upon.

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| | |
|---|---|
| 5 gallons | £1 7 6 |
| 10 „ | £1 15 0 |

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| | |
|---|---|
| 5 gallons | £1 15 0 |
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### The "LAVATORY."

Will heat one quart of water in a minute to 100°. A wonderfully effective and handy little contrivance for obtaining Hot Water at a moment's notice.

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Made rectangular at the back to fit in corners and so economize space. In three sizes.

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Size of 10-Gallon Heater: Height, 3ft. 3 in.; arc, 16 in.; angles, 12 in.

Made in Copper in three sizes—

| | |
|---|---|
| 10 Gallons . | £5 0 |
| 15 „ . | £5 15 |
| 20 „ . | £6 10 |

### THE "SPHINX" PATENT WATER-HEATER.

Copper, Japanned outside: 10 gallons, £4; 15 gallons, £4 13s.; 20 gallons, £5 5s.

Constructed to supply a sufficient body of water for a Bath, or other purpose, by raising a quantity of water speedily to a high temperature.

Requires very little fixing, and can always be added to a Bath already fixed with little labour in fitting.

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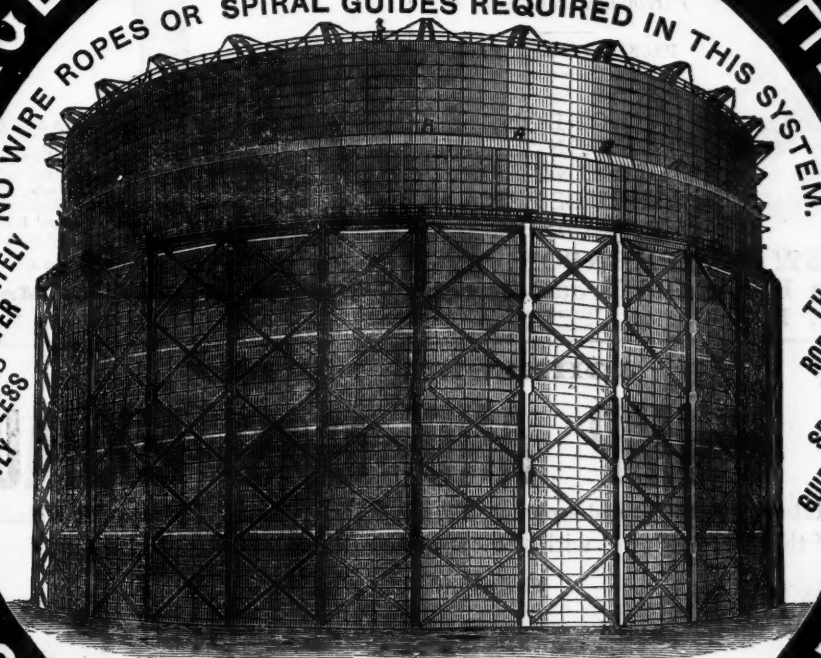

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[See Illustrated Advertisement, April 3, p. 597.]

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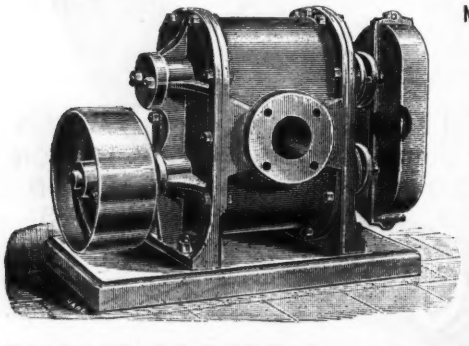

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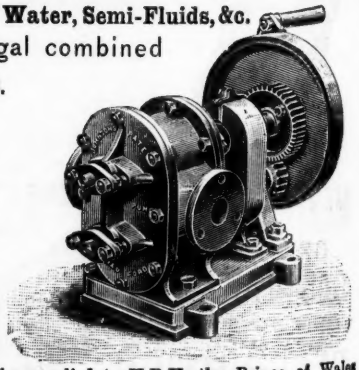

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**A 280-CANDLE POWER**
**PLAIN IRON LAMP,**
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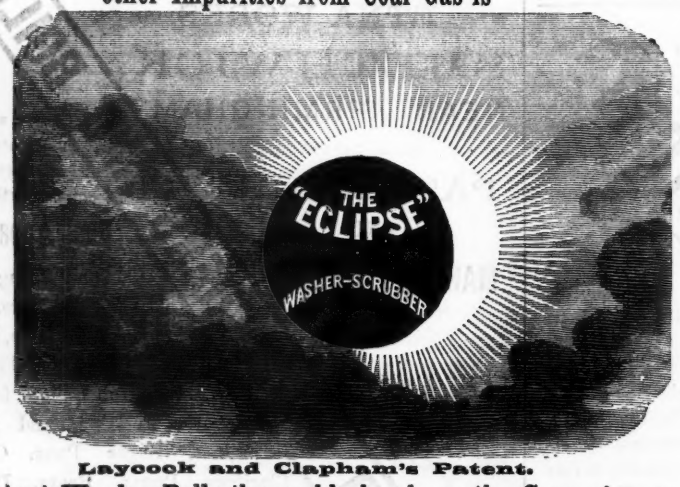


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